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GEOLOGICAL SURVEY OF ALABAMA
EUGENE ALLEN SMITH, STATE GEOLOGIST

BULLETIN No. 29

STATISTICS OF THE MINERAL PRODUCTION OF ALABAMA FOR 1923

COMPILED FROM THE MINERAL RESOURCES
OF THE UNITED STATES

BY
WALTER B. JONES, PH.D.
CHIEF ASSISTANT

UNIVERSITY OF ALABAMA
1925

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LETTER OF TRANSMITTAL

University, Ala., June, 1925.

Hon. William W. Brandon,
Governor of Alabama,
Montgomery, Ala.

Sir:—I have the honor to transmit herewith the manuscript of a report on the Mineral Production of Alabama for the year 1923, with the request that it be printed as Bulletin No. 29 of the Geological Survey of Alabama.

Very respectfully,

Eugene A. Smith,
State Geologist.

GEOLOGICAL CORPS

Eugene Allen Smith, Ph.D.	State Geologist
Walter Bryan Jones, Ph.D.	Chief Assistant
George Huntington Clark	Assistant Geologist
Robert S. Hodges, D.Sc.	Chemist
Mrs. Herbert H. Smith	Assistant Curator of Museum
R. M. Harper, Ph.D.	Geographer
A. T. Donoho	Secretary
George N. Brewer	Field Assistant

RIVER GAUGE HEIGHT OBSERVERS

Elk River at Elkmont, Alabama

Dr. Wm. E. Maples, until April 1, 1925

T. O. Watson, since April 1, 1925

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PREFACE

THE statistics of all the mines in the following pages have been collected in co-operation with the United States Geological Survey, and have been compiled from advance chapters and tabulation sheets of the Mineral Resources of the United States, a publication of the Federal Survey and Census.

The introductory matter, statistics and discussions in each of these articles has either been taken without change, or else has been rearranged or condensed, or entirely rewritten to suit it to our present purposes. In either case, credit is given to the author.

INTRODUCTION

THE mineral industries of Alabama continued to show improvement over the slump of 1921, the grand total for 1923 being almost that of 1920, which was the banner year. Increases were made in every branch, except sandstone and mineral waters, both of which showed very slight decreases. Several divisions practically doubled, and all the rest of the increases were very substantial ones. Perhaps the more important of the boosts in production were those of the coal and iron industries, all departments of which showed considerable stimulation. Transportation conditions remained effective and dependable, while labor troubles were almost nil. Installation of improved mining machinery has been of great importance, especially in the mining of iron ore. The whole situation may be taken as a return to normal conditions that characterize peace-time operations.

The statistics and discussions which may be inspected in the various chapters of this bulletin have been changed somewhat from the custom which has been in vogue for several years. The most radical change is the omission of much introductory matter in the chapters on graphite, iron ore, mica, etc. The reason for this is that this bulletin should serve the purpose of enumerating the production and discussions arising therefrom and give in addition general statements regarding the status of the various industries in the United States. Any information dealing with the individual branches, other than statistical, may be had from the general publications of this Survey, a list of which will be sent upon request. Most of the principal industries and many of the minor ones have been treated in more or less detailed manner in the host of reports issued by this Survey over a period of more than a half a century. All of the introductory matter which has been left out of this report may be found in revised and enlarged form in the new edition of the Mineral Index of Alabama, which will be available for distribution in a comparatively short time.

The production for 1922 and 1923 is presented in the following table in the order of importance:

Mineral Production in Alabama, 1922 *and* 1923

Rank	PRODUCT	1922		1923	
1	Pig Iron (derived), tons	2,223,159	$ 42,883,424	2,784,625	$ 64,912,809
2	Coal (raw), tons	18,324,740	42,856,000	20,457,649	51,624,000
3	Coke (derived), tons	3,799,865	14,708,245	4,654,075	19,817,394
4	Iron Ore (raw), tons	5,294,520	8,791,069	6,922,663	15,540,198
5	Portland Cement (derived), barrels	2,324,116	4,135,684	3,395,392	6,257,673
6	Clay products (derived)		2,798,255		4,409,371
7	Lime (derived), tons	168,135	979,331	193,429	1,627,539
8	Limestone (raw), tons		787,040	1,253,500	1,362,084
9	Sand and gravel (raw), tons	848,743	346,920	1,829,559	760,326
10	Hydrated lime (derived), tons			19,526	173,571
11	Clay (raw), tons	60,523	49,765	90,618	118,419
12	Graphite (raw), pounds		†	1,570,900	79,754
13	Sandstone (raw), tons		41,395	45,660	39,609
14	Manganese ore (raw), tons		†	694	8,067
15	Asphalt rock (raw), tons			1,200	4,200
16	Mineral waters (raw) gallons	5,389	875	4,878	763
17	Gold (raw), fine ounces			5.51	114
	Miscellaneous		702,533		946,440
	Steel, bauxite and puzzolan cement*				
	Total (raw)		$ 53,575,597		$ 70,535,974
	Total (derived)		65,504,939		97,198,357
	Grand total		$119,080,536		$167,734,331

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*Figures not available, 1923.

†Included in miscellaneous: 1922, graphite, manganese ore, marble, bauxite, barytes, mica; 1923, marble, barytes, fuller's earth.

STATISTICS OF THE MINERAL PRODUCTION OF ALABAMA FOR 1923

ABRASIVES

By EUGENE A. SMITH AND WALTER B. JONES

THERE was no production of abrasives in Alabama for the year 1923. For many years a few millstones (chasers*) were quarried and shaped at Dutton, Jackson County, but this lone source appears to have fallen out temporarily. Some stones were shaped, but none were sold.

Considerable prospecting has been done on tripoli, and it is quite likely that the near future will see this commodity taking its place in the production columns.

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*Chasers are larger than the regular millstones. They are used for heavier work, such as grinding quartz, feldspar, barytes, etc., and they run on edge. Though they are made with a diameter as short as 24 inches, they are usually turned out with diameters ranging from 50 to 84 inches, and are as much as 22 inches in thickness. These chasers are run on pans paved with roughly cubical blocks of the conglomerate, with edges about a foot in length. In grinding quartz in such pans the chasers are used in the preliminary crushing; then rough blocks, usually three in number, are either attached to or carried along by lateral arms, which in turn are joined to a vertical revolving shaft. By the circular movement of these blocks the material placed in the pan is ground to powder.

ARSENIC

By V. C. Heikes and G. F. Loughlin

ALABAMA

INTEREST was shown during the year in certain veins in adjacent parts of Randolph and Clay Counties, Alabama, near Cragford. These veins are distributed through at least four townships. They cut slate or phyllite and were worked for gold years ago. The gold was obtained mostly by panning and by concentrating the oxidized free-milling ore, but operations ceased at ground-water level, where the oxidized ore passed into sulphides containing considerable arsenopyrite.

According to G. R. Mansfield, who visited the district early in 1924, the veins are lenticular to irregular masses of quartz and pegmatite which strike about N. 35° E and dip 35° S.E. The arsenopyrite, accompanied by minor quantities of pyrite, chalcopyrite, and galena, occurs in the veins as masses and disseminated grains but is commonly localized between relatively pure quartz and wall rock. The workings, nearly all shallow pits, were filled with water and afforded little opportunity for inspection. The arsenopyrite that could be seen in place consisted principally of layers from 1 to 3 or 4 inches thick, but more promising material lay on the dumps and gave the impression that the ores were worthy of further exploration as to tonnage and adaptability to concentration. Single ore shoots may be small, but it remains to be seen whether several shoots can be profitably worked to supply a concentrator and roasting plant. The rolling topography and the proximity of the district to the Atlanta, Birmingham & Atlantic Railway and to hydro-electric power are favorable factors, though the shallow-water level is likely to add materially to costs of operation. Conclusions similar to Mansfield's are expressed in a preliminary report on these deposits by G. H. Clark, a mining engineer of Birmingham. The deposits are held under option by two or three persons. If they can be successfully developed, the white arsenic from them may find a local market at the new plant of the Gulf States Chemical & Refining Company at Montgomery, Ala. This plant, using the Kennedy electrolytic process, was to be completed in the Spring of 1924, and the company expected to purchase white arsenic in the open market.

ASPHALT ROCK

By K. W. Cottrell

Native Asphalt and Bitumens—The asphaltic and bituminous materials mined or quarried in the United States include bituminous or asphalt-bearing rock and mineral bitumens and waxes—gilsonite, grahamite, impsonite, ozokerite and wurtzilite. Wurtzilite, mined in Utah, has also been sold under the name elaterite. Producers reported sales in 1923 of all these varieties except grahamite and impsonite. The material produced in largest quantity and value is bituminous rock, mined in Kentucky, Texas, Oklahoma, California and Alabama (named in the order of magnitude of output) and used as paving material. The other bituminous products are used in many ways, as for the manufacture of paints, varnishes and cements. The sales of native asphalt and related bitumens in the United States in 1923 increased 22 per cent in quantity and 28 per cent in value.

The Asphalt Association—The members of the asphalt industry established in 1919 the Asphalt Association, which, in addition to other activities, is engaged in collecting and disseminating information useful to both producers and users of asphalt. Any one desiring such information may address the association, 25 West Forty-third Street, New York City, or at the following branch offices:

25 North Pearl Street, Albany, N. Y.
302 Latta Arcade Building, Charlotte, N. C.
729 Hearst Building, Hearst Square, Chicago, Ill.
314 Dwight Building, Kansas City, Mo.

PRODUCTION

Production of Bituminous Rock in the United States, 1918-1923

	Short Tons	Value
1918	25,346	$ 92,238
1919	53,589	262,309
1920	132,353	531,134
1921	284,037	1,788,715
1922	298,047	1,629,440
1923	365,601	2,190,009

Production of bituminous rock in Alabama began in 1923 with 1,200 short tons, valued at $4,200.

PRODUCER

Alabama Rock Asphalt Company, Florence, Alabama.

CRUDE BARYTES

By C. E. Siebenthal and E. R. Phillips

DEPOSITS

FROM one to three miles north of Angel Station and about twelve miles northwest of Jacksonville, Calhoun County, there are a series of barytes deposits on which a little development has been done. These deposits lie at the base of a white quartzite ridge in residual clay that is derived from blue-gray magnesian limestone, whose age has not been definitely determined but which is probably Knox dolomite.

Other deposits near Vincent, Harpersville and Wilsonville, Shelby County, and Leeds, Jefferson County, were under development in 1918. The barytes was mined from red residual clay overlying limestone of Beekmantown age.* High grade barytes has been produced from these developments and indications at a number of places point to larger bodies than the irregular masses first found.

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*A chapter on barytes and barium products that was more than ordinarily detailed and was accompanied by a map showing the location of barytes deposits and barium-product manufactories was given in Mineral Resources for 1915.

PRODUCTION

Crude Barytes Shipped by Domestic Producers in the United States, 1922-23, by States

State	1922				1923			
	Short tons	Percentage of total	Value f.o.b. at mine		Short tons	Percentage of total	Value f.o.b. at mine	
			Total	Average			Total	Average
California	3,338	2	$17,707	$5.30	*	*	*	*
Georgia	57,045	37	468,517	8.21	83,291	39	$670,343	$8.05
Missouri	66,421	43	421,568	6.35	81,701	38	629,097	7.70
North Carolina	*	*	*	*	1,179	1	7,076	6.00
Tennessee	16,642	11	124,204	7.46	34,384	16	259,005	7.53
Other States**	11,594	7	91,954	7.93	13,628	6	98,635	7.24
	155,040	100	1,123,950	7.25	214,183	100	1,664,156	7.77

*Included under "Other States."

**1922: Alabama, Idaho, Illinois, North Carolina and South Carolina. 1923: Alabama, California, Kentucky, South Carolina, Virginia and Wisconsin.

†States having less than three producers each are grouped together to avoid disclosing confidential information.

PRODUCERS

Alabama Barytes Co., (Inc.) mine at Harpersville, Shelby County.
Bertha Mineral Co., mine at Angel, Calhoun County.

BAUXITE

By James M. Hill

DOMESTIC PRODUCTION

THE bauxite industry of the United States showed marked improvement in 1923 over 1922, owing to the increased demand for the products made from bauxite, particularly aluminum and aluminous abrasives. The domestic production of bauxite increased 69 per cent. In the Arkansas field the increase was 85 per cent, but the eastern field was not so productive, showing a decrease of 33 per cent.

Bauxite Produced in the United States, 1919-1923

Year	Georgia, Alabama and Tennessee		Arkansas		Total	
	Long tons	Value*	Long tons	Value*	Long tons	Value*
1919	43,076	$346,588	333,490	$1,855,159	376,566	$2,201,747
1920	40,029	349,453	481,279	2,897,892	521,308	3,247,345
1921	14,700	134,400	124,850	755,400	139,550	889,800
1922	42,810	329,440	266,790	1,682,890	309,600	2,012,330
1923	28,810	176,030	493,880	2,980,580	522,690	3,156,610

*Value f.o.b. mines.

DEPOSITS

The Republic Mining & Manufacturing Company was the only producer of bauxite in Alabama in 1923, and its operations at Rock Run, Cherokee County, were very small. During the year considerable prospecting was done in the Eufaula district, the area between Fort Gaines and Clayton, in Henry and Barbour Counties, on a westward continuation of the kaolin-bauxite belt of the Coastal Plain. It is reported that there are a number of scattered deposits of bauxite of chemical grade in this area, some of which will doubtless be worked in competition with South American bauxite, as well as with the more easily accessible Georgia fields.

PRODUCER

The Republic Mining and Manufacturing Co., near Rock Run, Cherokee County, Alabama.

CEMENT

By E. F. BURCHARD AND B. W. BAGLEY

GENERAL REVIEW

A SUMMARY of the monthly estimates of output of Portland cement in 1923, compiled from the monthly reports of producers, was published by the United States Geological Survey early in January, 1924. These estimates, which indicated a production of about 137,400,000 barrels and shipments of about 135,900,000 barrels, were within about 0.6 and 0.2 per cent, respectively, of the final figures for 1923, which were released June 18, 1924.

The year 1923 began with both production and shipments of Portland cement at a much higher rate than in January, 1922, and showing an upward trend instead of the midwinter lag that has often characterized the output of cement. During the active season, from May to October, production and shipments attained higher levels than in 1922, and at all times except in September and October there was more than 6,000,000 barrels of cement in stock at the mills.

Comments by Portland cement manufacturers on trade conditions in 1923 indicate that demand was generally better than in 1922 and that shipping and manufacturing conditions were nearly everywhere more satisfactory, owing to better transportation facilities and absence of coal shortage that in former years have been caused by strikes. The increased demand was due almost entirely to large road contracts and increased building construction, although in places only one of these factors may have been operative. A very few slightly unfavorable comments came from the Middle, Southwestern and Northwestern States. One encouraging comment was to the effect that the improved financial standing of farmers had proved an aid to the cement industry.

A summary of value of buildings shown by permits issued during 1920-1923 in 180 cities representing all parts of the United States is given in the following table to illustrate the general trend of building construction during these years. The grand totals for the four years show successive increases, and in 1922 and 1923 there were increases in all districts, but in 1921 there were decreases in New England and in certain Eastern, Central and Southwestern States.

In the second table is shown a summary of value of contracts awarded for buildings of all classes and for engineering construction work of all other kinds, including public works. The net increase in 1923 for construction work of all kinds was considerably lower than that for buildings alone.

Value of Buildings Shown by Permits Issued, by Districts, 1920-1923*

Group of Cities	1920	1921	1922	1923	Increase in 1923 over 1922 (per cent)
North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Tennessee, Arkansas and Louisiana	78,759,000	79,630,000	119,858,000	145,596,000	21

*From Bulletin of Portland Cement Association showing values tabulated in detail by cities, based on Bradstreet's and American Contractor building statistics.

PORTLAND CEMENT

PRODUCTION, SHIPMENTS AND STOCKS

The total production of Portland cement in the United States in 1923, as reported to the United States Geological Survey, showed an increase of 20 per cent over that of 1922. The shipments from the mills showed increases of 15 per cent in quantity and more than 24 per cent in gross value. The average selling price at the mills increased 14 cents a barrel, or about 8 per cent. The production of 137,460,238 barrels of 376 pounds net is equivalent to 549,840,952 sacks, 23,073,683 long tons, or 25,842,525 short tons.

The statistics in the following table are arranged by States, so far as possible. The term "active plant" is applied to a mill or group of mills located at one place and operated by one company, but if a company operates establishments at different places its mill or group of mills at each place is counted as a plant. In the table by districts statistics are given for groups of States, generally not more than three, or parts of States, that are geographically and commercially related.

Of the 27 States in which Portland cement was manufactured in 1923, all but one showed an increase in production and all but three showed an increase in shipments, as compared with 1922. All the commercial districts showed increases in both production and shipments, the gains in production ranging from 6 to 33 per cent and in shipments from 5 to 24 per cent. The net change for the whole country was an increase of 20 per cent in production and of 15 per cent in shipments. In 1923 production exceeded shipments by 1,548,120 barrels.

The statistical tables show extraordinary increases in production in certain States or districts—for instance, in Alabama there was a gain of 53 per cent, and in the district in which this State is situated there was a gain of 33 per cent. Two large new mills began producing cement in Alabama in 1923, and a third mill was enlarged. The production in other States, such as Ohio, Michigan and Iowa, was likewise increased by the building of new mills. The increase in output in States where no new mills were built was as a rule due to increase in capacity of existing mills, stimulated no doubt by the increase in projected road building and construction work, as, for example, in California.

Portland Cement Produced, Shipped and in Stock in Alabama, 1922 and 1923

	Production					Shipments							Stock		
	Active plants		Barrels		Increase, 1923 (per cent)	1922		1923		Average factory value per barrel		Increase in quantity, 1923 (per cent)	Barrels		Increase, 1923 (per cent)
	1922	1923	1922	1923		Barrels	Value	Barrels	Value	1922	1923		1922 (revised)	1923	
Alabama	3	5	2,290,884	3,497,256	53	2,324,116	$4,135,684	3,395,392	$6,257,673	$1.78	$1.84	46	34,901	136,765	+292

Portland Cement Produced, Shipped and in Stock in Virginia, Tennessee, Alabama and Georgia, 1922 and 1923

	Production					Shipments							Stock		
	Active plants		Barrels		Increase, 1923 (per cent)	1922		1923		Average factory value per barrel		Increase in quantity, 1923 (per cent)	Barrels		Increase 1923 (per cent)
	1922	1923	1922	1923		Barrels	Value	Barrels	Value	1922	1923		1922 (revised)	1923	
Virginia, Tennessee, Alabama, and Georgia	8	11	5,954,043	7,908,846	33	6,158,652	10,854,347	7,620,850	14,210,617	1.76	1.86	24	169,597	457,593	+170

Shipments of Domestic Cement From Mills Into Alabama and Per Capita, 1922 *and* 1923

	1922			1923		
	Population Jan. 1, 1923, estimated*	Shipments to States, in barrels		Population Jan. 1, 1924, estimated*	Shipments to States, in barrels	
		Total	Per capita		Total	Per capita
Alabama	2,413,092	998,009	0.41	2,434,731	1,489,531	0.61

*Bureau of the Census.

Estimated Surplus in Local Supply of Portland Cement in Alabama, 1922-1923, *in Barrels*

	1922			1923		
	Shipments from mills	Estimated consumption	Surplus	Shipments from mills	Estimated consumption	Surplus
Alabama	2,324,116	998,009	+1,326,107	3,395,392	1,489,531	+1,905,861

PRICES

At Factories—Average values of Portland cement sold at the factories, as reported to the Geological Survey, are shown in the tables of shipments by States and districts during 1922 and 1923. The averages by States ranged from $1.73 a barrel in Minnesota to $2.39 in California in 1923, compared with a range from $1.60 in Indiana to $2.62 in Oregon in 1922. The averages by districts ranged from $1.76 in the Illinois-Kentucky-Indiana district to $2.44 in the Oregon-Washington-Montana district in 1923, compared with a range of $1.61 to $2.42 in the same districts in 1922. The general average value for the whole country showed an increase in 1923 of nearly 8 per cent, and averages increased in all the districts except Colorado-Utah and in all the States except Colorado, Texas, Utah and Washington.

The average factory value of Portland cement may be slightly higher in certain States than it would be if the ordinary structural cement were the only kind produced, on account of the marketing of certain special cements that command a higher price. Among these are white Portland cement, made in Pennsylvania, and cements made particularly for shutting out water in oil wells and for stucco finish, both made in California. Oil-well work requires a rapid-setting cement, and for stucco work a cement that is more than ordinarily plastic and water-proof is desirable.

Average Factory Value Per Barrel in Bulk of Portland Cement, 1912-1923

1912	$0.813	1916	$1.103	1920	$2.02
1913	1.005	1917	1.354	1921	1.89
1914	.927	1918	1.598	1922	1.76
1915	.860	1919	1.714	1923	1.90

At Markets—A summary of wholesale prices of Portland cement in bulk in carload lots at the principal cities of the United States and at Montreal, Canada, by months, for 1922 and 1923, as published in the Engineering News-Record, is given below. This table is not absolutely consistent, as is indicated in the footnotes, and there are some inconsistencies that are not accounted for by the footnotes, such as sudden large changes in prices. The figures in this table are susceptible of comparison in several different ways. Comparison of prices at a single locality between corresponding months of 1922 and 1923 and between the several months of the same year can readily be made, as well as comparisons between prices at different localities. Nearly everywhere prices were higher throughout 1923 than in corresponding periods of 1922, and the trend of prices during 1923 indicates that in the Winter months lower prices prevailed. The net result of the movement of market prices in 1922, as with factory prices, was downward, the decreases ranging between 4 and 56 cents a barrel, and in 1923 it was upward, the increases reaching 50 cents a barrel or more in places. Seattle, Wash., is the only place at which the prices remained practically stationary, and prices here appear to have remained nearly the same throughout 1922 and 1923. Other places at which prices appear to have been higher than would seem to be justified by their location with respect to mills and transportation routes were Atlanta, New Orleans and Baltimore, although at Baltimore the prices appear to include cost of delivery. The extraordinarily high price of $3.50 a barrel at Atlanta in May, 1923, may be questioned as to accuracy, as it stands as a single quotation preceded and succeeded by lower prices within intervals of one week. As might be expected, the lowest market prices were quoted at cities near which Portland cement is manufactured, such as Duluth, Chicago, Pittsburgh, St. Louis, Birmingham and Dallas, but there are other cities where the proximity of cement mills might be expected to bring about lower prices than the table shows. In New York two scales of prices are quoted, the higher for cement delivered, the lower for cement alongside dock, the difference ranging from 10 to 40 cents a barrel, but this difference does not show any marked influence of foreign cement, nor do the prices at Los Angeles indicate the competition that has been exerted by imported cement.

The differences between average factory values for 1922 and 1923, by districts, and the market prices of cement at the principal cities within the several districts as a rule do not appear to be excessive when all the elements that enter into these differences are taken into consideration. In 1922 they ranged from 24 cents to $1.05 a barrel and in 1923 from 9 cents to $1.41 a barrel. In most districts these differences were less than 75 cents a barrel in both years.

The increase in the prices of building materials, along with those of all other commodities, since the beginning of the World War has so seriously affected the living conditions of the people that many inquiries into the price situation have naturally followed, as well as efforts to protect the public against organized price manipulation.

In view of the fact that the annual per capita consumption of Portland cement in the United States has reached nearly 1¼ barrels and promises to continue to increase, the prices of this essential building material have attracted particular interest, and considerable information is now available to show their position among those of other structural materials and to explain the economic conditions by which they are determined. Data of interest in this connection compiled by the United States Bureau of Labor Statistics, Department of Labor, are given below. This list comprises the principal building materials, but a few materials of minor importance showed a smaller percentage of increase than cement.

Comparative Prices of Building Materials in December, 1923*

(Percentage of increase over prices in 1913)

Building materials in general, simple average, 43 types	79.8
Lime (lump), average, United States	139.5
Plate glass, 3 to 5 feet, New York	132.4
Turpentine, New York	119.1
Brick, common, simple average at 82 brickyards	116.2
Linseed oil, New York	98.7
Douglas fir, No. 1, common at mills	90.1
Yellow-pine flooring, B and better, at mills	83.2
Oak, plain white, No. 1, Cincinnati	75.6
Portland cement, simple average at 6 representative plants	74.9

A detailed analysis of the current position of prices and price levels in the Portland cement industry, published early in 1924, is commended to the attention of all who wish to study this subject.** The authors availed themselves of our four Government sources of information as to cement prices and of many series of monthly and weekly prices issued by engineering and trade journals. They also had the advantage of making an examination of the earnings of the cement companies during 1922 as indicated in their income tax statements filed with the Treasury Department for that year. These data have been published in tabular form and analyzed in the treatise, which also outlines the history of the cement industry.

MANUFACTURING CONDITIONS

PLANTS

Portland cement was made at 126 plants in 1923, compared with 118 in 1922. Eight new plants produced Portland cement in 1923. These are equipped (at the end of 1923) as follows:

Phoenix Portland Cement Co., plant near North Birmingham, Jefferson County, Ala. Dry process; limestone and shale; clinker burned with coal; three 10 by 150 foot kilns; reported daily clinker capacity, 4,000 barrels.

Lehigh Portland Cement Co., plant at Tarrant City (near North Birmingham), Jefferson County, Ala. Wet process; limestone and clay; clinker burned with coal; three 10 to 11¼ by 190 foot kilns; reported daily clinker capacity, 2,900 barrels.

Pyramid Portland Cement Co., plant at Valley Junction, Polk County, Iowa. Wet process; limestone and shale; clinker burned with coal; two 10 to 11¼ by 240 foot kilns; reported daily clinker capacity, 2,400 barrels.

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*Wholesale prices of commodities for December, 1923, pp. 6-7, U. S. Department of Labor, Bureau of Labor Statistics, 1924.

**Willis, H. P., and Byers, John R. B., Portland cement prices, their basis, character and present position, 123 pp., New York, Ronald Press., 1924.

New Egyptian Portland Cement Co., plant at Port Huron, St. Clair County, Mich. Wet process; limestone and clay; clinker burned with coal; one 11¼ by 200 foot kiln; reported daily clinker capacity 1,600 barrels.

Aetna Portland Cement Co., plant at Bay City, Bay County, Mich. Dry process; limestone, clay, and shale; clinker burned with coal; one 10 by 200 foot kiln; reported daily clinker capacity, 1,250 barrels.

Sandusky Cement Co., plant at Silica, Lucas County, Ohio. Wet process; limestone, clay, cement rock, and shale; clinker burned with coal; three 10 by 150 foot kilns; reported daily clinker capacity, 3,300 barrels.

Sun Portland Cement Co., plant at Lime, Baker County, Oreg. Wet process; limestone and shale; clinker burned with oil; one 9 to 10 by 210 foot kiln; reported daily clinker capacity, 1,200 barrels.

Signal Mountain Portland Cement Co., plant at North Chattanooga, Hamilton County, Tenn. Wet process; limestone and clay; clinker burned with coal; two 11 by 175 foot kilns; reported daily clinker capacity, 3,000 barrels.

Additional plants were under construction but not completed in 1923 in California, Michigan, Ohio, South Dakota, Tennessee, Texas and Wisconsin. Several of them will report production in 1924.

KILNS AND FUELS

The total number of rotary kilns reported in plants that operated in 1923 was 793, compared with 760 in 1922. Recent studies by conservation engineers have indicated that the diameter of rotary kilns should be considered as well as the length. Some mills have increased the diameter of the lower end of the kiln in the belief that this would result in an increase in the output of clinker.

As to kiln fuels the records of 1923 show that 78.7 per cent of the Portland cement produced was burned with coal alone, compared with 75.7 per cent in 1922. The percentage burned with crude oil increased slightly—in fact, the increase in the production of cement in California, where oil only is used, was over 10 per cent of the entire increase in production of cement in the United States in 1923.

Portland Cement Burned by Different Fuels in 1922 *and* 1923

Fuel	1922				1923			
	Number of plants	Number of kilns	Barrels of cement	Percentage of total	Number of plants	Number of kilns	Barrels of cement	Percentage of total
Coal	90	590	86,864,274	75.7	101	641	108,272,858	78.7
Coal and crude oil	7	64	12,030,542	10.5	1	24	8,091,506	5.9
Coal and natural gas	1	6			....	....		
Crude oil and nat'l gas	....	....	....	....	2	9		
Crude oil	17	85	12,794,890	11.1	18	95	16,313,410	11.9
Crude oil, coal, and natural gas	2	8	3,100,278	2.7	3	18	4,782,464	3.5
Natural gas	1	7			1	6		
	118	760	114,789,984	100.0	126	793	137,460,238	100.0

This includes the annual capacity of eight new plants completed during the year, amounting to about 5,830,000 barrels of finished Portland cement. According to these figures the total production of Portland cement in 1923 was 84.9 per cent of the total capacity, whereas the production in 1922 represented 78.5 per cent of the apparent total capacity in that year. It is very difficult to arrive at a true approximation of the cement manufacturing capacity of the country. Some manufacturers report varying totals from year to year, although the same equipment is indicated. For 1923 four concerns reported a capacity less than their production for the year, but due allowance was made for this oversight in the present estimates. The record production for one month during 1923 was reached in October when 13,350,000 barrels was made, or 98 per cent of the monthly capacity based on the annual capacity stated above. At this rate 160,200,000 barrels would be produced in a year, but in all probability the mills of the country could not sustain so great a productivity for so long a period, even under the most favorable operating conditions and liveliest demand for cement, and therefore it appears as if the capacity stated above for 1923 may be slightly excessive.

Portland Cement Manufacturing Capacity of the United States, by Commercial Districts, 1922 *and* 1923

District	Estimated capacity (barrels)		Percentage of capacity utilized	
	1922	1923	1922	1923
Eastern Pennsylvania, New Jersey and Maryland	41,921,000	42,195,000	74.4	84.7
New York	8,567,000	8,306,000	69.1	84.2
Ohio, western Pennsylvania and West Virginia	12,133,000	15,090,000	88.6	89.4
Michigan	7,930,000	9,346,000	78.7	81.5
Illinois, Indiana and Kentucky	21,550,000	22,296,000	83.5	95.1
Virginia, Tennessee, Alabama and Georgia	7,113,000	10,719,000	83.7	73.8
Eastern Missouri, Iowa and Minnesota	14,177,000	16,580,000	80.4	84.7
Western Missouri, Nebraska, Kansas and Oklahoma	10,215,000	11,795,000	78.6	82.9
Texas	4,425,000	4,642,000	82.0	90.0
Colorado and Utah	2,850,000	3,025,000	70.9	80.3
California	10,464,000	12,594,000	83.3	87.4
Oregon, Washington and Montana	4,858,000	5,270,000	60.6	58.9
	146,203,000	161,858,000	78.5	84.9

MASONRY, NATURAL AND PUZZOLAN CEMENTS

The term "masonry cement" has been introduced here for certain cements, made by grinding calcined calcareous rock, like natural cements, that are being used very largely in mortar for laying brick and stone, although, of course, other hydraulic cements are also suitable for masonry work.

Natural cement, including masonry cement, was produced in 1923 in 10 plants, distributed in eight States—near Rosendale, N. Y.; Siegfried, Pa.; Lisbon, Ohio; Speeds, Ind.; Utica, Ill.; Fort Scott, Kans.; Kosmosdale, Ky.; and Austin and Mankato, Minn.

One manufacturer with a plant at Birmingham, Ala., reports an output of puzzolan or slag-lime cement, and in order that this quantity may be included in the cement totals for the United States without revealing confidential information it is included with the statistics of masonry and natural cements.

The next table, which gives such statistics as may be presented concerning the output of masonry, natural and puzzolan cements in 1922 and 1923, indicates an increase in quantity of about 43 per cent and in value of more than 50 per cent as compared with the output in 1922. The average factory value per barrel in 1923 was $1.53, compared with $1.45 in 1922. The output has been expressed in terms of 376-pound barrels, to correspond with the statistics for Portland cement.

Masonry, Natural and Puzzolan Cement Shipped, 1922 *and* 1923

State	1922			1923		
	Producing plants	Barrels of 376 pounds	Value	Producing plants	Barrels of 376 pounds	Value
Alabama*	1	497,081	$798,434	1	684,563	$1,137,585
Illinois	1			1		
Indiana	1			1		
Kansas	1	392,347	495,164	1	587,111	809,767
Kentucky**	----			1		
Minnesota	2			2		
New York	1			1		
Ohio	1			1		
Pennsylvania	1			1		
	9	889,428	1,293,598	10	1,271,674	1,947,352

*Puzzolan only.
**No shipments reported for 1922.

PRODUCERS

National Cement Co., Ragland, Alabama. Plant at Ragland, St. Clair County.

Southern Cement Co., Birmingham, Alabama. Plant at North Birmingham, Jefferson County.

Atlas Portland Cement Co., 25 Broadway, New York City. Plant at Leeds, Jefferson County.

Phoenix Portland Cement Co., plant at North Birmingham, Jefferson County.

Lehigh Portland Cement Co., plant at Tarrant City, near North Birmingham, Jefferson County.

Gulf States Portland Cement Co., Demopolis, Alabama, plant at Spocari, Marengo County.

CLAY

By JEFFERSON MIDDLETON AND EUGENE A. SMITH

CLAY available for the manufacture of clay products is one of the most widely distributed of our minerals. Hence there are clay-working plants scattered over every State and territory in the Union. Miners of the low-grade clays are usually also the manufacturers, but as the higher grades of ware are reached, the rule is that fewer and fewer manufacturers are also miners, until in the highest grades of ware the rule is that the manufacturer buys and does not mine the clay he uses. The figures given in the following tables represent clay that is mined and not manufactured by the miner, but is sold as clay. The clay thus sold is small in quantity cómpared with the total production and includes mainly clay used for high-grade pottery and tile, for paper making, and for refractory products.

Production of Clay in Alabama From 1911 *to* 1923, *Inclusive, and a Comparison of the Production in* 1923

Year	Fire clay		Miscellaneous clay		Total	
	Quantity Short tons	Value	Quantity Short tons	Value	Quantity Short tons	Value
1911	35,203	29,909	....	....	35,203	29,909
1912	38,552	31,414	4,500	2,000	43,052	33,414
1913	49,901	53,269	*	*	49,901	53,419
1914	27,973	34,607	....	....	27,973	34,607
1915	31,520	34,882	*	*	31,870	35,232
1916	40,235	50,618	1,244	435	41,479	51,053
1917	41,951	67,674	....	....	58,667	84,763
1918	49,516	48,611	532	582	50,048	49,193
1919	49,372	46,497	19,931	28,641	69,303	75,138
1920	45,612	51,220	1,900	39,790	47,512	91,010
1921	45,520	38,077	1,332	10,659	46,852	48,736
1922	55,483	44,355	4,820	4,750	60,523	49,765
1923	77,440	108,478	13,178	9,941	90,618	118,419
Increase	21,957	64,123	8,358	5,191	30,095	68,654
Percentage	38	145	173	108	50	138

*Not divulged but included in total.

PRODUCERS

Bibb County—Bibbville Fire Brick & Manufacturing Company.

Blount County—Priestley Toulmin, Jr., Secretary.

Calhoun County—Kraus Research Laboratories, Inc.

DeKalb County—Ladd Fire Brick Company.

Franklin County—Spruce Pine Sand and Gravel Company.

Jefferson County—Imperial Coal and Coke Company; Robertson Brick Company; Harbison-Walker; Bibby Coal, Shale and Clay Company, Inc.

Talladega County—Silver Run Clay Company.

CLAY AND REFRACTORY PRODUCTS

By Walter B. Jones

THERE was a general increase of both quantity and value of clay products of Alabama over that of 1922, increases being recorded in every division except red earthenware. The increase in value of all clay and pottery products was 61 per cent, or a very substantial increase in this important industry of the State.

The value of common brick went over the million dollar mark for the third time in the State's history, this figure having been reached in 1919 and 1920. The quantity of common brick made in 1923 represents the highest point yet reached in this branch of the industry. The values for 1919 and 1920 were reached on account of high prices instead of increased production, leaving 1923 as the banner year for common brick output.

Alabama is rich in clays of almost every variety, and ranks seventeenth (1923) among the 42 producing States in clay sold as such. In spite of the fact that the clays are widely distributed throughout the State, the products are mostly confined to less than half a dozen groups, with common brick leading the field.

The statistics given in the table below have been compiled by the United States Bureau of the Census, to include everything *made*, whether it was *sold* or not. The rule followed by the United States Geological Survey for these statistics was to include everything marketed or used during the year, regardless of when it was manufactured. The Geological Survey got out the reports up to and including 1920, when the Bureau of the Census took it over. This difference is explained in order that proper interpretations may be arrived at from comparisons of figures which represent the two different methods.

The details of the clay products are as follows:

Clay Products Produced in Alabama in 1922 *and* 1923

Class of Product	1922			1923			Percentage increase or decrease (—)	
	Number of establishments	Quantity	Value	Number of establishments	Quantity	Value	Quantity	Value
Common brick	26	88,530,000	$ 805,589		123,475,000	$ 1,279,859	51	59
Face brick	6	11,252,000	349,717		24,694,000	420,058	124	20
Hollow building tile* (tons)	6	46,008	322,097		46,016	426,712		32
Fire brick	4	15,480,000	444,737		19,913,000	692,704	30	56
Other brick and tile products						54,097		
Red earthenware (flower pots, etc.)	6		15,300			2,090		—600
Other products (not specified)						28		
Miscellaneous**			860,815			1,533,823		78
Total†	39		$ 2,798,255	45		$ 4,409,371		61

*Partition, load-bearing, back-up, blocks, furring, book-tile.

**Includes floor arch, silo tile, corn-crib tile, conduits, radial chimney blocks, fireproofing, roofing tile, vitrified brick or block, drain tile, sewer pipe, silica brick, refractory cement, stoneware (except chemical) and yellow and Rockingham ware, and clay sold raw or prepared—all combined to conceal confidential information.

†Total number of establishments producing. Itemized list counts establishments for each product.

PRODUCERS

Unfortunately, the list of producers for 1923 is not available. However, we are able to submit a list of all workers in clay products, which should include all those having actual production in 1923. The list is as follows:

BRICK AND TILE

BARBOUR COUNTY

Eufaula—Chattahoochee Brick Company.

BLOUNT COUNTY

Sibleyville—P. O. Warrior—Birmingham Clay Products Co., Birmingham, Ala.

COFFEE COUNTY

Elba—Elba Brick Company.

COVINGTON COUNTY

Cawthon—Andalusia Brick Company, Andalusia, Ala.

CULLMAN COUNTY

Cullman—Cullman Brick Company.

ESCAMBIA COUNTY

Fishpond—Cedar Creek Brick Co., Inc., Brewton, Ala.
Brewton—Keego Brick Co.

ETOWAH COUNTY

Attalla—H. M. Johnson Brick Co.
Gadsden—Gadsden Clay Products Co.

HALE COUNTY

Greensboro—H. F. Horn & Sons.

JEFFERSON COUNTY

Littleton—Bibby Coal Shale & Clay Co.
Birmingham—Birmingham Brick Company, Inc.
Birmingham—Robertson Brick Company.
Alton—Russell Clay Mfg. Company.
Coaldale—Southern Clay Manufacturing Co., Chattanooga, Tenn.
Lovick—Stephenson Brick Co., Inc., Birmingham, Ala.
Graves—Southern Clay Manufacturing Co., Chattanooga, Tenn.

LIMESTONE COUNTY

Athens—Athens Brick Company.

MADISON COUNTY

Huntsville—Huntsville Brick Company.

MARENGO COUNTY

Demopolis—Cherry Red Brick Co.

MONTGOMERY COUNTY

Montgomery—Excelsior Brick Co.
Montgomery—Jenkins Brick Co.

MORGAN COUNTY

Albany—Decatur Brick Co.
Decatur—Alabama Brick & Tile Co.

CHAMBERS COUNTY

Abanda—M. P. Craver, Roanoke, Ala.

RUSSELL COUNTY

Brick Yard—Bickerstaff Brick Co., Columbus, Ga.
Dixieland—Dixie Brick Company, Columbus, Ga.

SAINT CLAIR COUNTY

Ragland—Alphons Custodis Chy. Constr. Co., New York City.

TALLADEGA COUNTY

Childersburg—Childersburg Brick Co., Inc.
Sylacauga—Sylacauga Brick Co.

TUSCALOOSA COUNTY

Tuscaloosa—The Thress Brick Company, Inc.

CALHOUN COUNTY

Oxford—Anniston Refractories Co.

JEFFERSON COUNTY

Bessemer—Alabama Clay Products Co., Birmingham, Ala. (two plants).

Birmingham—Southern Sewer Pipe Works, Kansas City, Mo. Walter S. Dickey.

Ensley—Birmingham Hollow Tile Co., Birmingham, Ala.

North Birmingham—Vulcan Tile & Brick Co., Birmingham, Ala.

Fairfield—Harbison-Walker Refractories Co., Pittsburg, Pa.; Birmingham Brick Company.

DALE COUNTY

Newton—T. L. Rosser Brick Mfg.
Franklin—Spruce Pine Pottery Co.

LAUDERDALE COUNTY

Florence—Hauerurs Brick Yard.

GENEVA COUNTY

Geneva—Hand and Martin; Geneva Brick Company.

JEFFERSON COUNTY

Alton—Copeland Inglis Shale Brick Co.

BARBOUR COUNTY

Eufaula—Eufaula Brick Company.

CLAY COUNTY

Ashland—Mr. E. B. McPherson.

SUMTER COUNTY

Cuba—Cuba Brick & Pottery.

COLBERT COUNTY

Sheffield—Sheffield Brick Co.

ESCAMBIA COUNTY

Brewton—Strong Brick & Lumber Co.

JEFFERSON COUNTY

Bessemer—The Standard Brick Co.

POTTERY

ELMORE COUNTY

Wetumpka—Wetumpka Pottery Works.

ETOWAH COUNTY

Gadsden—Cook Bros. Pottery Company.

SHELBY COUNTY

Sterrett—Sterrett Pottery Works.

RANDOLPH COUNTY

Rock Mills—Wm. Pounds.

CLEBURNE COUNTY

Borden Springs—Mr. A. C. Roberts.

RANDOLPH COUNTY

Rock Mills—J. A. Boggs.

TUSCALOOSA COUNTY

Ralph—M. J. Miller.

PERRY COUNTY

Sprott—Miller Junction Factory; W. M. Miller.

COAL

By Eugene A. Smith and Walter B. Jones

Introductory

THE great Appalachian coal region which furnishes over two-thirds of the coal production of the United States and which extends from Ohio and Pennsylvania on the north in a gradually narrowing belt through Eastern Kentucky and Tennessee as its southern terminus in a considerably broadened area that occupies a large part of the northern half of Alabama. The coal-bearing formations of Alabama underlie about 8,400 square miles and are divided into four distinct basins, the Coosa, the Cahaba and the Warrior, named from the rivers which drain them, and the Plateau, which includes Blount, Lookout and Sand or Raccoon Mountains. By far the most important basin in area and in production is the Warrior, which includes all of Walker County, most of Jefferson, Tuscaloosa and Fayette Counties, and smaller parts of Blount, Cullman, Winston and Marion Counties. The area known to contain coal is approximately 4,000 square miles, or one-half the total coal area of the State, and contributes about 85 per cent of the total production.

There are several distinct coal groups in the basin, the most important of which are the Brookwood, the Pratt and the Mary Lee, designated by the names of their principal beds. The Mary Lee group includes the Blue Creek, the Jagger and the Newcastle beds, most of which are mined in places. The Brookwood, the Pratt and the Mary Lee produce most of the coking coal mined in the State, and more than half of all of the coal mined in the district.

The Cahaba Basin, second in importance, is a long narrow syncline, 68 miles long and about six miles wide, southeast of the Warrior, and occupies parts of St. Clair, Jefferson, Shelby and Bibb Counties. There are many workable beds, and the total quantity of coal in the basin is large. The production is something over 16 per cent of the total for the State.

The Coosa Basin is a deep syncline east of the Cahaba and parallel with it, extending across Shelby and St. Clair Counties. It is also long and narrow, 60 miles long by six miles wide. It has not been thoroughly explored, but in different parts of the area from two to twelve beds, three or more feet in thickness, have been reported.

The Plateau Field embraces parts of Blount, Etowah, DeKalb, Cherokee, Marshall and Jackson Counties, and, although it has an area underlain by coal four times that of the Cahaba and the Coosa combined, the resources in Alabama are comparatively small. There are four to six beds locally workable. So far as known, the earliest record of the existence of coal in Alabama was made in 1834. The first statement of production in the State is contained in the United States census report for 1840, in which year the production is given at 946 tons. The census report for 1850 does not mention any coal production for the State, and the next authentic record is contained in the census statistics of 1860, when Alabama is credited with an output of 10,200 short tons. The mines of Alabama were probably worked to a considerably extent during the Civil War, but there are no records of the actual production until 1870, for which year the United States census reports a production of 11,000 tons. Ten years later the production had increased to 323,972 short tons, but the development of the present great industry really began in 1881 and 1882, when attention was directed to the large iron deposits near the City of Birmingham and thus the great "boom" of that city and vicinity was inaugurated. By 1885 the coal production of the State had increased to nearly 2,500,000 tons. Then followed a period of relapse and liquidation, which lasted two years, after which business settled down to a conservative and rational basis and has since developed steadily. In 1902 the coal production of the State reached a total of more than 10,000,000 tons, and reached the maximum of 17,678,522 tons in 1913, since which time there has been a decrease, until 1916, when the maximum of 1913 was exceeded, as may be seen in the table below.

PRODUCTION

The statistics of production in Alabama from 1840 to the close of 1923 are shown in the following table:

Production of Coal in Alabama From 1840 *to* 1923, *in Short Tons*

Year	Quantity	Year	Quantity	Year	Quantity	Year	Quantity
1840	946	1861	10,000	1882	896,000	1903	11,654,324
1841	1,000	1862	12,500	1883	1,568,000	1904	11,262,046
1842	1,000	1863	15,000	1884	2,240,000	1905	11,866,069
1843	1,200	1864	15,000	1885	2,492,000	1906	13,107,963
1844	1,200	1865	12,000	1886	1,800,000	1907	14,250,454
1845	1,500	1866	12,000	1887	1,950,000	1908	11,604,593
1846	1,500	1867	10,000	1888	2,900,000	1909	13,703,450
1847	2,000	1868	10,000	1889	3,572,983	1910	16,111,462
1848	2,000	1869	10,000	1890	4,090,409	1911	15,021,421
1849	2,500	1870	11,000	1891	4,759,781	1912	16,100,600
1850	2,500	1871	15,000	1892	5,529,312	1913	17,678,522
1851	3,000	1872	16,800	1893	5,136,935	1914	15,593,422
1852	3,000	1873	44,800	1894	4,397,178	1915	14,927,937
1853	4,000	1874	50,400	1895	5,693,775	1916	18,086,197
1854	4,500	1875	67,200	1896	5,748,697	1917	20,068,074
1855	6,000	1876	112,000	1897	5,893,770	1918	19,184,962
1856	6,800	1877	196,000	1898	6,535,283	1919	15,536,721
1857	8,000	1878	224,000	1899	7,593,416	1920	16,140,099
1858	8,500	1879	280,000	1900	8,394,275	1921	12,568,899
1859	9,000	1880	323,972	1901	9,099,052	1922	18,324,740
1860	10,200	1881	420,000	1902	10,354,570	1923	20,457,649
Total							425,842,158

It will be observed from the foregoing table that the coal production for 1923 eclipsed all previous records for the State, passing the high mark of 1917 by 400,000 tons. This production is detailed in the tables given below:

Coal Produced in Alabama and Distribution at Mine in Net Tons, 1917, 1922 *and* 1923

Distribution	1917	1922	1923
Loaded at mines for shipment	15,272,716	17,376,060	19,520,634
Sold to local trade or used by employes	508,398	360,811	370,754
Used at mines for steam and heat	641,733	290,187	307,356
Made into coke at mines	3,645,227	*	*
Total quantity	20,068,074	18,324,740	20,457,649
Total value	$45,616,992	$42,856,000	$51,624,000
Average value per ton	$2.27	$2.34	$2.52

*Not at liberty to disclose.

Statistics of Production of Coal in Alabama in 1923

County	Number of operators	Loaded at mines for shipment (net tons)	Sold to local trade and used by employes (net tons)	Used at mines for steam and heat (net tons)	Made into coke at mines (net tons)	Total quantity (net tons)	Total value	Average value per ton	Number of employes				Average number of days worked	Average hours per day
									Underground					
									Miners, loaders, shot-firers	All others	Surface	Total		
Bibb	15	1,192,795	5,338	28,938		1,227,071	$3,345,134	$2.73	1,174	498	392	2,064	207	8
Blount	3	257,007	†	†		263,515	667,282	2.53	358	57	99	514	165	9
Etowah	3	†	†	†		132,155	366,179	2.77	161	25	50	236	302	8
Franklin	1		†			†	†	*	*	*	*	*	*	*
Jefferson	45	9,410,779	113,367	170,221	†	9,749,869	24,561,806	2.52	7,338	3,921	2,288	13,547	254	9
Marion	2	†	†	†		†	†	*	*	*	*	*	*	*
St. Clair	4	772,016	†	26,648		803,281	1,984,310	2.47	503	206	85	794	271	10
Shelby	16	660,113	4,990	11,374		676,477	2,197,851	3.25	872	339	234	1,445	201	9
Tuscaloosa	17	974,009	22,577	17,238	203,403	1,217,227	2,741,444	2.25	1,028	423	294	1,745	258	8
Walker	75	5,898,200	211,965	38,903		676,477	2,197,851	3.25	872	339	234	1,445	201	9
Winston	9	19,736	2,100			21,836	66,234	3.02	44	15	15	74	112	8
Wagon mines	27	38,010				38,010	85,000	2.24						
Grand totals	217	19,520,634	370,754	307,356	†	20,457,649	51,624,000	$2.52	17,304	7,330	5,401	30,035	232	9

†Included in totals.

*Concealed to prevent disclosing confidential information.

Coal Produced in Alabama, 1917-1923, in Net Tons

County	1917	1918	1919	1920	1921	1922	1923	Increase or decrease	Percentage increase or decrease
Bibb	1,624,623	1,374,548	1,034,099	968,001	643,992	1,039,689	1,227,071	+ 187,382	+ 18
Blount	266,729	315,095	283,606	285,384	302,390	320,960	263,515	— 57,445	— 21
Etowah	154,265	130,538	91,397	76,568	75,107	98,810	132,155	+ 33,345	+ 33
Jefferson	10,453,093	9,379,957	7,548,567	7,719,910	5,864,475	8,184,867	9,749,869	+ 1,565,002	+ 19
St. Clair	836,995	832,348	668,304	562,209	646,212	803,297	803,281	— 16	— 0
Shelby	781,858	744,111	562,863	586,996	460,496	627,141	676,477	+ 49,336	+ 8
Tuscaloosa	923,735	1,032,705	872,778	914,186	538,402	1,176,764	1,217,227	+ 40,453	+ 3
Walker	4,844,480	5,156,269	4,290,298	4,768,457	3,919,884	5,997,279	6,149,068	+ 151,789	+ 3
Winston	43,900	76,527	65,006	36,195	33,150	28,380	21,836	— 6,544	— 30
Small mines	8,466	2,264	413	----	----	----	38,010	----	----
Other counties*	129,930	140,600	119,390	121,886	84,794	----	179,140	----	----
Total quantity	20,068,074	19,184,962	15,536,721	16,140,099	12,568,899	18,324,740	20,457,649	+ 2,132,909	+ 12
Total value	$45,616,992	$54,752,329	$45,937,681	$58,637,010	$38,713,000	$42,856,000	$51,624,000	+ 18,768,000	+ 24

*1917-1921 includes Cullman, Jackson and Marion. 1923 includes Marion and Franklin.

LABOR STATISTICS

Men Employed in the Mines of Alabama in 1920-1923

Nature of Work	1920	1921	1922	1923
Underground	20,355	21,173	23,143	24,634
Surface	5,185	4,636	5,026	5,401
Total	25,540	25,809	28,169	30,035
Average number of days worked	247	166	215	232

Statistics of Labor Employed in Coal Mines of Alabama, 1908-1923

Year	Number of days active	Average number employed
1908	222	19,197
1910	249	22,210
1911	227	22,707
1912	245	22,613
1913	255	24,552
1914	226	24,042
1915	223	22,591
1916	262	25,308
1917	273	28,386
1918	278	26,221
1919	239	26,874
1920	247	25,540
1921	166	25,809
1922	215	28,169
1923	232	30,035

Coal Produced Per Man and Average Number of Days Per Year in Alabama From 1920 *to* 1923, *Inclusive*

Year	Days mine worked	Average tonnage	
		Per year	Per day
1920	247	632	2.56
1921	166	458	2.76
1922	215	650	3.02
1923	232	681	2.94

AVERAGE VALUE OF ALABAMA COAL

Average Value Per Short Ton for Coal at Mines in Alabama Since 1914

1914	1915	1916	1917	1918	1919	1920	1921	1922	1923
$1.34	$1.28	$1.37	$2.27	$2.85	$2.96	$3.63	$3.00	$2.34	$2.52

MINING METHODS

The term "mining method" as used here refers to the manner in which the coal is broken down in the mine and not to the system of mining, or by room and pillar or long wall. In the mine the coal is either blasted from a solid face—shot from the solid, as in hard-rock mining—or is shot loose or otherwise broken down after a preliminary cut into the coal has been made. This cut may be made by hand or machine. Underground methods are therefore classified as shot from the solid, mined by hand and mined by machines. An increasing quantity of coal is being recovered each year by stripping the cover from the bed in open pits by steam shovels. The bed thus exposed is for the most part shattered by powder and shoveled into cars by hand, although in places it is picked up directly by small steam shovels.

Opposition to shooting from the solid has developed, because it is injurious to the mining property in that the unusual charges of powder weaken the roof and pillars, which increases the liability to falls of roofs and coal, the most prolific cause of fatal accidents to coal miners. Another objection to this method is that the heavy charges of powder required to blow down the coal where it has not been previously undercut or sheared cause the production of a very high proportion of fine coal and render the lump coal so friable that it disintegrates in handling and in transportation. With the growing use of mechanical stokers and of powdered coal, the latter objection is losing much of its force, but the danger attending the method has been in nowise diminished, and it is forbidden by law in some of the coal-mining States. Shooting off the solid is still practiced in Alabama, but it is not to be advised.

COAL-WASHING OPERATIONS

Not all coal can be cleaned by hand picking. Some coal beds or parts of beds have layers or benches of slate and bone, or contain more than the allowable quantity of sulphur in the form of iron pyrite so thoroughly mixed with the coal that crushing is necessary to free the coal from the refuse. To clean such coal washing is resorted to and the coal, being lighter than the refuse, is separated by currents of water. Coal is also cleaned in the dry state.

PRODUCERS

BIBB COUNTY

Bessemer Coal, Iron and Land Co., Birmingham. Mines Belle Ellen Nos. 1, 8, 9 and 12.

Alabama Blocton Coal Co., Blocton, Ala. Blocton No. 3.

Tenn. Coal, Iron and R. R. Co., Birmingham, Ala. Blocton Nos. 9, 10.

Blocton Cahaba Coal Co., Coleanor, Ala. Mine at Coleanor, Ala.

Garnsey Coal Co., Garnsey, Ala. Mine at Garnsey, Ala.

Hills Creek Mining Co., West Blocton, Ala. Mine at Hills Creek, near West Blocton.

Roden Coal Co., Marvel, Ala. Marvel Nos. 2, and 3.

Bibb Coal Co., Birmingham, Ala. Norris mine near Blocton, Ala.

Little Cahaba Coal Co., Piper, Ala. Mines Piper Nos. 1 and 2.

Red Feather Coal Co., Blocton, Ala. Red Feather mine at Blocton.

Blocton Mining Co., West Blocton, Ala. Mine, Smiths Shaft, near Blocton, Alabama.

Moffat Coal Co., St. Louis, Mo. Mine at Dixie on M. & O. R. R.

Blocton Export Coal Co. Mine at Tico.

Braehead Coal Mining Co. Mine at Hills Creek.

Mosena Cahaba Coal Co. Mine Bell Ellen No. 8.

BLOUNT COUNTY

Lehigh Coal Co., Lehigh, Ala. Lehigh mine.

Moss & McCormick, Birmingham, Ala. Nyota mine, near Warrior, Ala.

Montgomery Coal Co., Warrior, Ala.

ETOWAH COUNTY

W. P. Clayton, Gadsden, Ala. Clayton mine.

Gulf States Steel Co., Birmingham, Ala. Mines at Altoona Drift Nos. 1, 2 and VanZandt.

Sligo Coal Mining Co., Gadsden, Ala. Mine at Sligo, Ala.

FRANKLIN COUNTY

Riley Taylor Coal Co., Phil Campbell, Ala.

JEFFERSON COUNTY

Ajax Coal and Mining Co., Johns, Ala. Ajax mine.

Pratt Consolidated Coal Co., Birmingham, Ala. Arcadia, Banner, Eldorado, Jett, New Pratt, Praco.

Tennessee Coal, Iron and R. R. Co., Birmingham, Ala. Mines at Bayview, Docena, Edgewater, Hamilton Slope, Pratt Nos. 1, 2, 3 and 7, and Wylam Nos. 1, 2, 3, 4, 5, 6, 7, 8, 10, 14.

American Fuel Co., Warrior, Ala. Beltona mine.

Sloss-Sheffield Steel and Iron Co., Birmingham, Ala. Bessie, Coalburg No. 1, Flat Top, New Found, Blossburg Nos. 2, 3, and 4.

McMath Sons Coal Co., Sayreton, Ala. Big Four mine.

H. P. Stith Mining Co., Republic, Ala. Big Oak mine.

Birmingham Water Works Co., Birmingham, Ala. Birmingham Water Works mine.

Burgin Coal Co., Birmingham, Ala. Black Creek mine.

Imperial Coal & Coke Co., Birmingham, Ala. Bradford, Dixiana mines.

Brookside Pratt Mining 'Co., Birmingham, Ala. Buckeye, Cardiff Nos. 2 and 3, Coalburg, and Pinkney Nos. 1, 2 and 4.

East Pratt Coal Co., Birmingham, Ala. Clift mine.

Woodward Iron Co., Woodward, Ala. Dolomite Nos. 1 and 3, Mulga.

South Pratt Coal Co., Birmingham, Ala. East Blossburg mine.

G. D. Etter, Jr., Warrior, Ala. Elvista mine.

New Found Creek Coal Co., Morris, Ala. Eulamo mine.

North Pratt Coal Co., Birmingham, Ala. Hillhouse mine.

Central Alabama Coal Co., Kimberly, Ala. Kimberly Nos. 2, and 3.

Birmingham Trussville Iron Co., Birmingham, Ala. Labuco mine.

The Alabama Coal Co., Birmingham, Ala. Lewisburg mine.

Majestic Coal Co., Birmingham, Ala. Majestic mine.

New Castle Coal Co., Birmingham, Ala. New Castle Nos. 2, and 6.

Flat Creek Mining Co., Birmingham, Ala. North Labuco mine.

North Birmingham Coal Co., Sayreton, Ala. O'Hare mine.

Franklin Coal Mining Co., Birmingham, Ala. Powhatan mine.

Republic Iron & Steel Co., Birmingham, Ala. Palos, Sayreton, Thompson and Warner.

Turkey Creek Coal Co., Morris, Ala. Rogers mine.

Gulf States Steel Co., Birmingham, Ala. Sayre, and Virginia mines.

Birmingham Clay Products Co., Birmingham, Ala. Langely mine.

Cahaba Valley Coal Co., Birmingham, Ala.

County Coal Co. of Ala., Inc., 1 to 3 East Main Street, Carnegie, Penna.

Crescent Coal Co., Birmingham, Ala. Seloca Nos. 2 and 7.

Henry Ellen Coal Co., Birmingham, Ala.

Montgomery Black Creek Coal Co., Warrior, Ala.

Morris Coal Co., Morris, Ala.

Rogers-Talty Coal Co., Warrior, Ala. Pritchett mine.

Shades Valley Coal Co., Birmingham, Ala. Winston mine.

Alabama Fuel and Iron Co. Mines Overton Nos. 1 and 2.

T. H. Friel and Son. Apace mine.

Hughes Coal Co.

Lens Coal Co. Mine at Lens.

New Phoenix Coal Co. Dupont-Phoenix mine.

Parkwood-Cahaba Coal Co. Mine at Parkwood.

Porter Coal Co. Mine at Porter.

J. D. Ratliff.

MARION COUNTY

Brilliant Coal Co., Birmingham, Ala. Brilliant mine.

Turner Mining Co., Brilliant, Ala. Turner mine.

ST. CLAIR COUNTY

Alabama Fuel & Iron Co., Birmingham, Ala. Acmar Nos. 1, 2, 3; Margaret 1, 2, 3, 5, New Acton.

Seaboard Coal Mining Co.

R. A. Jones.

W. Wilson.

SHELBY COUNTY

Montevallo Mining Co., Birmingham, Ala. Aldrich mine.
Southern Coal & Coke Co., Boothton, Ala. Boothton mine.
Brookside Pratt Mining Co., Birmingham, Ala. Coalmont mine.
Little Gem Coal Co., Birmingham, Ala. Dogwood mine.
Eureka Coal Co., Birmingham, Ala. Eureka Nos. 2, 3 and 4.
West Helena Coal Co., Sicard, Ala. Sicard mine.
Montevallo Straven Coal Co., Straven, Ala. Straven mine.
Alabama Fuel & Iron Co., Birmingham, Ala. Acton Nos. 2 and 5.
Helena-Straven Coal Co., Straven, Ala.
Premier Coal Co., Helena, Ala.
Paramount Coal Co., Helena, Ala.
Shelby Coal Co., Birmingham, Ala. Superior mine.
Shelby Cahaba Coal Corp., Birmingham, Ala.
Buck Coal Co.
Thomas & Welles Mining Co. Aldrich mine.
Wadsworth Coal Co.

TUSCALOOSA COUNTY

Aetna Coal Co., Birmingham, Ala. Aetna mine.
The Alabama Co., Birmingham, Ala. Brookwood and Searles mines.
Big Sandy Iron and Steel Co., Coaling, Ala. Cedar Grove mine.
Cannon Shepherd Coal Co., Tuscaloosa, Ala. Gilmore mine.
Central Coal & Iron Co., Holt, Ala. Kellerman mine.
Liberty Coal Co., Birmingham, Ala. Liberty mine.
Riverview Coal Co., Tuscaloosa, Ala. Mabel mine.
Davis Creek Coal and Coke Co., Rock Castle, Ala. Rock Castle No. 3 mine.
Daniels Creek Coal Co., Birmingham, Ala. Woodrow mine.
Yolande Coal & Coke Co., Birmingham, Ala. Yolande No. 3 mine.
Boyd Bros., Peterman, Ala.
Henderson Land & Lumber Co., Tuscaloosa, Ala.
Warrior View Coal Co., Tidewater mine.
J. M. Maxwell, Maxwell mine.
Alco Coal Co.
Black Diamond Coal Mining Co. Doenell mine.
Calhoun Land & Mining Co.

WALKER COUNTY

Bertha Coal Co., Parrish, Ala. Bertha mine.
Annie Mae Coal Co., Corona, Ala. Annie Mae mine.
Farmers Coal Co., Fayette, Ala. Atlas mine.
Atlas Mining Co., Oakman, Ala. Atlas No. 2.
Bankhead Coal Co., Jasper, Ala. Bankhead mine.
Barney Coal Co., Cordova, Ala. Barney mine.
Benoit Coal Mining Co., Benoit, Ala. Benoit mine.
Parrish Coal Co., Parrish, Ala. Blanton No. 2, Gayosa No. 1.
Stith Coal Co., America, Ala. Stith mine.
Borden Coal Co., Cordova, Ala. Borden mine.
Boyce Coal Co., Cordova, Ala. Boyce mine.
Thomas Creek Coal Co., Carbon Hill, Ala. Bynom Nos. 1 and 2.
Brilliant Coal Co., Birmingham, Ala. Calumet mine.
Carbon Hill Consolidated Coal Co., Birmingham, Ala. Carbon Hill mine.
Kershaw & Co., Birmingham, Ala. Cedrom and Dora mines.
Charlotte Coal Co., Oakman, Ala. Charlotte mine.
S. J. Childers & Sons, Jasper, Ala. Childers mine.
Pratt Consolidated Coal Co., Birmingham, Ala. Clipper, Dora No. 10, Gamble, Gamma, Ruby, and Wegra.
Shackleford Coal Mining Co., Nauvoo, Ala. Davis mine.

Sipsey Coal Mining Co., Empire, Ala. Dilworth mine.

Doliske Coal Co., Dora, Ala. Doliske mine.

Dora Fuel Co., Dora, Ala. Dora Fuel mine.

Dorman Coal Co., Inc., Birmingham, Ala. Dorman mine.

Sloss-Sheffield Steel and Iron Co., Birmingham, Ala. Ivy mine.

Galloway Coal Co., Memphis, Tenn. Galloway Nos. 10, 11, 13, 15, and at Carbon Hill, Alabama.

Corry Coal Mining Co., Oakman, Ala. Gaslight mine.

Cordova Warrior Coal Co., Grays Shaft mine.

Guy V. O'Rear, Carbon Hill, Ala. Hynd mine.

Indian Head Mills of Alabama, Cordova, Ala. Indian Head mine.

Jagger Coal Co., Birmingham, Ala. Jagger No. 1.

Carbon Coal Co., Birmingham, Ala. Jagger No. 3.

Townley Coal Co., Townley, Ala. Lang mine.

Mount Carmel Co., Cordova, Ala. Mount Carmel mine.

Oakman Mining Co., Oakman, Ala. Oakman mine.

Railway Fuel Co., Parrish, Ala. Parrish mine.

Piedmont Coal Co., Birmingham, Ala. Piedmont mine.

Pratt Fuel Co., Dora, Ala. Pratt Fuel mine.

Dinsey Coal Co., Cordova, Ala. Red Oak mine.

Nelson Coal Corp., Birmingham, Ala. Red Star mine.

Gulf States Portland Cement Co., Cordova, Ala. Riverside mine.

Burnwell Coal Mining Co., Birmingham, Ala. Samoset and Yerkwood mines.

Louise Coal Co., Parrish, Ala. Louise mines.

Saragossa Mining Co., Saragossa, Ala. Saragossa mine.

America Mining Co., America, Ala. Standard mine.

Monro-Warrior Coal & Coke Co., Birmingham, Ala. Stirling mine.

Sulphur Springs Coal Co., Cordova, Ala. Sulphur Springs mine.

Summit Coal Co., Dora, Ala. Summit mine.

Supreme Mining Co., Birmingham, Ala. Supreme mine.

Brookside-Pratt Mining Co., Birmingham, Ala. Warrior River mine.

Winona Coal Co., Gorgas, Ala. Winona mine.

Cedrom Coal Mining Co., Townley, Ala.

Daylight Coal Mining Co., Jasper, Ala.

I. O. Drewrey Contracting Co., Jasper, Ala. Sunlight mine.

Manchester Coal Co., Manchester, Ala.

Mary Lee Coal Mining Co., Saragossa, Ala.

Mill Creek Coal Co., Carbon, Hill, Ala.

Olive Coal Co., Oakman, Ala. Johnson mine.

Pratt Warrior Coal Co., Quinton, Ala.

H. A. Todhunter, Cordova, Ala.

Wabash Coal Mining Co., Oakman, Ala. Gravlee No. 1.

Alpine Coal Co. Big Ridge mine.

Baker Coal Co., Inc. Baker mine.

Beechy Hollow Coal Co. Beechy Hollow mine.

Brown & Kropp Coal Co.

DeBardeleben Coal Corporation. Corona Nos. 10, 11, 12, 13, 14; Empire Nos. 1, 3; Payne Bend; Sipsey and Townley No. 1 mines.

Ensor Coal Co. Cordova Fuel mine.

Gavosa Coal Co. Rainbow mine.

Jasper Land Co. West Corona mine.

John Henry Coal Co. Hayes mine.

Lancaster Mining Co. Gravlee mine.

Monfray-Justice Coal Co.

Pocahontas Coal & Mining Co. Pocahontas mine.

Dixie Coal & Mining Co. Wabash No. 2 mine.

Sartain-Boyer Coal Co. Boyer and Sartain mines.

Mont. Jones.

WINSTON COUNTY

Gamble Bros., Delmar, Ala. Mascot mine.

Glen Mary Coal Co., P. O. Box 625, Birmingham, Ala. Glen Mary mine.

M. J. Nailen, Delmar, Ala.

Shanks Coal Co., Natural Bridge, Ala. Shanks mine.

J. M. Thomason, Natural Bridge, Ala. Beulah mine.

T. P. Weaver, Delmar, Ala.

Lynn Coal Mining Co. Cranford mine.

Studdard & Shorer. Eclipse mine.

J. T. Williams.

COKE

By Walter B. Jones

The coke industry of Alabama showed a substantial increase for 1923 over that of 1922, due to increased activity in iron and steel products. Most of the coke was used in the blast furnaces of the State, with minor amounts going into various other industrial uses.

Alabama has always been an important producer of coke, usually ranking fourth in the United States, exceeded only by Pennsylvania, Ohio and Indiana, in the order named.

The details of the coke production may be had from the following tables:

Statistics of the Manufacture of Coke in Alabama, 1880-1923

Year	Ovens		Coal used (short tons)	Yield of coal in coke (per cent)	Coke produced (short tons)	Total value of coke at ovens	Value of coke at ovens (per ton)
	Beehive	By-Product					
1880	316	....	106,283	57.0	60,781	$ 183,063	$3,01
1890	4,805	....	1,809,964	59.0	1,072,942	2,589,447	2.41
1900	6,529	....	3,582,547	58.9	2,110,837	5,629,423	2.67
1910	9,852	280	5,272,322	61.6	3,249,027	9,165,821	2.82
1915	8,568	750	4,695,938	65.4	3,071,811	8,545,555	2.78
1916	8,806	743	6,794,100	57.9	4,298,417	15,019,137	3.45
1917	8,813	847	7,638,841	63.9	4,892,583	28,394,272	5.80
1918	8,586	847	6,827,826	64.0	4,352,172	30,813,378	7.03
1919	8,025	1,009	5,170,878	64.0	3,554,786	19,175,176	6.64
1920	8,482	1,081	6,031,034	64.3	4,221,427	35,645,459	8.46
1921	6,417	1,141	3,700,042	68.4	2,534,039	12,256,085	4.90
1922	6,360	1,196	5,625,642	67.6	3,807,420	14,708,245	3.86
1923	6,199	*1,196	6,872,003	67.7	4,654,075	19,817,394	4.22

*Includes 716 Koppers, 420 Semet-Solvay and 60 Wilputte ovens.

Production of Coke in Alabama in 1922 *and* 1923

Type	Year	Active ovens	Coal charged into Ovens					Yield of coke from coal (per cent)	Production		
			Quantity (net tons)								
			Washed	Unwashed	Total	Value	Per ton		Coke (net tons)	Value	Per ton
Beehive	1922	6,460	427,334	82,327	509,661	$ 1,306,423	$2.56	61.6	313,764	$ 1,754,973	$5.59
	1923	6,199	397,235	66,925	464,160	1,299,385	2.80	57.9	268,709	1,660,903	6.18
By-Product	1922	1,196	4,986,099	129,882	5,115,981	$12,630,514	$2.47	68.3	3,493,656	12,972,839	$3.71
	1923	1,196	6,296,282	112,561	6,408,843	18,954,008	2.96	68.4	4,385,366	18,156,491	4.07
Grand total	1922	7,656	5,413,433	212,209	5,625,642	$13,936,937	$2.48	67.6	3,807,420	14,727,812	$3.86
	1923	7,395	6,693,517	179,486	6,872,003	20,253,394	2.94	67.7	4,654,075	19,817,394	4.22

Sales of Coke in Alabama in 1922 *and* 1923

Type	Year	Used by producer		Furnace		Foundry		Domestic		Industrial and Miscellaneous		Stock		Shipments tonnage
		Tonnage	Value	Tonnage	Value	Tonnage	Value	Tonnage	Value	Tonnage	Value	Furnace	Foundry	
Beehive	1922	160,774	$ 963,969	*	*	64,276	$ 351,241	*	*	*	*	------	------	187,314
	1923	111,414	661,328	*	*	129,384	794,056	------	------	42,985	$294,637	20,018	1,263	232,818
By-Product	1922	3,075,709	10,692,893	*	*	265,930	1,511,173	109,906	576,988	------	------	487,039	*	------
	1923	3,991,309	14,904,844	171,650	998,473	279,721	2,050,208	97,342	663,854	95,206	423,157	268,340	------	1,864,199
Grand total	1922	3,236,483	$11,656,862	*	*	330,206	$1,862,414	*	*	*	*	487,039	*	187,314
	1923	4,102,723	$15,565,172	*	*	409,105	$2,844,264	*	*	*	*	288,358	*	2,096,017

*Concealed to prevent disclosing confidential information.

BEEHIVE COKE PRODUCERS

The Republic Iron & Steel Co., Republic Bldg., Youngstown, Ohio. Works at Thomas and Warner, Jefferson County, Alabama.

U. S. Cast Iron Pipe & Foundry Co., Bessemer, Ala. Works at Bessemer, Jefferson County, Ala.

The Alabama Co., Birmingham, Ala. Works at Brookwood, Tuscaloosa County, Ala.

Yolande Coal & Coke Co., Birmingham, Ala. Works at Yolande and New Connellsville, Tuscaloosa County, Ala.

The Barrett Co. Works at Virginia, Jefferson County, Ala.

Imperial Coal & Coke Co. Works at Bradford, Jefferson County, Ala.

Jenifer Iron Co. Works at Weller, Jefferson County, Ala.

BY-PRODUCT COKE PRODUCERS

Gulf States Steel Co., Brown-Marx Bldg., Birmingham, Ala. Works at Alabama City, Etowah County, Alabama.

Semet-Solvay Co., Syracuse, N. Y. Works at Ensley, Jefferson County, and Tuscaloosa, Tuscaloosa County, Alabama.

Tennessee Coal, Iron & R. R. Co., Birmingham, Ala. Works at Fairfield, Jefferson County, Alabama.

Woodward Iron Co., Woodward, Ala. Works at Woodward, Jefferson County, Alabama.

Sloss-Sheffield Steel and Iron Co., Hugh Morrow, President, Birmingham, Ala.

Alabama By-Products Corporation, Birmingham, Ala.

FULLER'S EARTH

By Jefferson Middleton

General Conditions

THE progress in the fuller's earth industry indicated in the report for 1922 continued in 1923, the production being the largest recorded and 7 per cent larger than that of 1922. There has been a steady increase in the production of fuller's earth since 1912, except in 1921, when there was a sharp decline of 18 per cent, but this was more than overcome in 1922 and 1923. The output in 1923 was nearly four times as large as that of 1913. The value of fuller's earth in 1923 was the third largest recorded, being exceeded by that of 1920 and 1922. It was only 2 per cent less than that of 1922 and 10 per cent less than that of 1920, but was 14 per cent greater than that of 1921 and six times as great as that of 1913. Since 1920 there has been a steady decline in average value per ton. Notwithstanding this decline, the value for 1923—$15.07—was higher than that of any year prior to 1919. Imports decreased markedly in 1923, the quantity being the lowest in more than 25 years.

The Department of Commerce does not report the exports of fuller's earth, but five operators reported that about 3,700 tons was exported to Canada, Cuba, Denmark, Dutch East Indies, Egypt, England, France, Germany, Holland, India, Mexico, Poland, Scotland, South America and Sweden. This would indicate a domestic consumption in 1923 of about 154,000 tons, of which the domestic supply constituted about 94 per cent.

OCCURRENCE

Fuller's earth has been reported as occurring in Alabama, Arizona, Arkansas, California, Colorado, Florida, Georgia, Illinois, Massachusetts, Minnesota, Mississippi, Missouri, Nebraska, Nevada, New York, Pennsylvania, South Carolina, South Dakota, Texas, Utah, Virginia and Washington, but in 1923 it was produced only in Alabama, Florida, Georgia, Illinois, Massachusetts and Texas. Plants in Arkansas and Pennsylvania that reported production in 1922 were idle in 1923.

USES

Fuller's earth is used principally as a filtering medium in the clarifying or bleaching of fats, greases and mineral and vegetable oils. Its original use was in the fulling of cloth, from which it derived its name. This use, however, at least in this country, has almost been abandoned. Fuller's earth is also said to be used in the manufacture of pigments for printing wall paper, in detecting certain coloring matters in some food products, as a substitute for talcum powder, and in medicine as a poultice and as an antidote for alkaloid poisons. Another suggested use is in deliming hides in the manufacture of leather. It has also been stated that the fuller's earth cake from oil mills can be used in the manufacture of hand soaps, concrete, water-proofing and asphalt preparations.

HISTORY

Fuller's earth was first discovered in the United States in 1891 near Alexander, Ark., by John Olsen. This earth was used for a time by the Southern Cotton Oil Company at Little Rock, Ark., but its use was finally abandoned.* The real beginning of the industry in this country was, however, in 1893 near Quincy, Fla., when quite by accident, in an unsuccessful effort to burn brick on the property of the Owl Cigar Company, an employe called attention to the close resemblance between the clay used and the German fuller's earth. This discovery in Florida caused considerable excitement, and deposits of fuller's earth were reported from a number of States, but the material in most of these deposits was found to have no value as fuller's earth. Production began in Florida almost immediately after the discovery, and in 1897-1899 fuller's earth was produced in Florida, Colorado, New York and Utah, with Florida the leading producer, a rank that it has maintained continuously. In 1901 Arkansas again became a producer. From 1904 to 1907 Arkansas was the second largest producer. Fuller's earth was found in Georgia soon after its discovery in Florida, but Georgia did not become a producer until 1907, when it was the third largest producing State, and it has ranked second since 1909, except in 1918 and 1919, when Texas was second. In 1904 Alabama and Massachusetts, in 1907 South Carolina and Texas, in 1909 California, in 1918 Nevada, and in 1922 Illinois and Pennsylvania first appeared as producers.

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*Branner, J. C., an early discovery of fuller's earth in Arkansas: Am. Inst. Min. Eng. Trans., vol. 43, pp. 520-522, 1913.

PRODUCTION

Domestic Fuller's Earth Sold in 1916-1923

Year	Operators reporting sales	Short tons	Value at mines	
			Total	Average
1916	10	67,822	$706,951	$10.42
1917	11	72,567	772,087	10.64
1918	14	84,468	1,146,354	13.57
1919	10	106,145	1,998,829	18.83
1920	12	128,487	2,506,189	19.51
1921	12	105,609	1,973,848	18,69
1922	15	138,944	2,289,719	16.48
1923	15	149,134	2,247,523	15.07

The small number of producers in some States makes it impossible to publish totals for those States without disclosing individual operations. Nearly all the earth produced in 1923 came from the Southern States. Two operators reported in Illinois, and one reported in Massachusetts. Florida was the leading State, Georgia was second, and Texas was third, as for a number of years. These three States reported 92 per cent of the output in 1923, compared with 97 per cent in 1922. Illinois was fourth, Massachusetts fifth and Alabama sixth. The outstanding features of the industry in 1923 were the decrease in production in Florida and Georgia and the increase in production in Illinois, by the addition of a new plant, and in Texas.

PRODUCER

Ladd Fuller's Earth Co., Fort Payne, Alabama. Mine near Fort Payne, DeKalb County, Alabama.

GOLD

By J. P. Dunlop

THE value of the gold produced by mines in Alabama during the period 1830 to 1921 was $766,632. None was reported in 1922. The value of the gold reported as produced from mines in Alabama in 1923 was $114, from surface placers in Cleburne County. Old properties, such as the Gold Log, Gold Ridge, and other mines in Cherokee, Randolph and Tallapoosa Counties, were idle. Only prospect work was done at the Jemison property in Chilton County. C. W. Stephens obtained some gold from prospecting near Arbacoochee.

Mine Production of Gold and Silver in the Eastern States in 1923, *by States*

State	Gold		Silver		Increase or decrease in value as compared with 1922	
	Fine ounces	Value	Fine ounces	Value	Gold	Silver
Alabama	5.51	$114	1	$1	+$114	+$1
Georgia	25,59	529	2	1	—2,695	—363
North Carolina and South Carolina	68.45	1,415	79	65	—556	+56
Pennsylvania	157.03	3,246	3,005	2,464	+646	+249
Tennessee	320.00	6,615	105,712	86,684	+2,295	+8,343
Virginia					—706	—6
	576.58	11,919	108,799	89,215	—902	+8,280
Total, 1922	620.22	12,821	80,935	80,935		

Mine Production of Gold and Silver in the Eastern States in 1923, by Sources, in Fine Ounces

State	Gold				Silver			
	Placers	Dry and siliceous ores	Copper ores	Lead and copper-lead ores	Placers	Dry and siliceous ores	Copper ores	Lead and copper-lead ores
Alabama	5.51				1			
Georgia	24.82	0.77			2			
North Carolina	3.87	20.41	29.03			4	74	
Pennsylvania			157.03				8,005	
South Carolina	15.14				1			
Tennessee			320.00				105,712	
	49.34	21.18	506.06		4	4	108,791	
Total, 1922	110.78	150.49	334.76	24.19	8	21	80,556	350

GRAPHITE

By JEFFERSON MIDDLETON

DURING the war Alabama was the leading State in the production of graphite, but the cessation of hostilities caused a slackening of production until 1921, but a few tons were reported. During 1922 three companies have again entered the field with the result that Alabama ranks second in production, with 577,940 pounds valued at $25,777. This production was almost trebled in 1923, the same three companies reporting 1,570,900 pounds valued at $79,754. The total production of crystalline graphite from Alabama in 1923 was about half the total for the United States.

In tabular form the details of the production are given below:

Year	Operators	Production (pounds)	Value
1922	3	577,940	$25,777
1923	3	1,570,900	79,754

Domestic Natural Graphite Sold in the United States, 1918-1923

Year	Number of active operators reporting	Amorphous		Crystalline	
		Short tons	Value	Pounds	Value
1918	42	6,560	$69,455	12,861,839	$1,454,799
1919	20	3,379	47,716	8,086,191	731,141
1920	17	4,694	49,758	9,632,360	576,444
1921	8	1,842	20,860	1,189,523	75,664
1922	7	2,200	*	1,849,766	85,242
1923	7	4,056	*	3,964,900	151,434

*Survey not at liberty to publish value.

Number of Operators Reporting Production of Graphite, 1918-23

State	1918	1919	1920	1921	1922	1923
Alabama	25	10	7	2	3	3
California	1	1	1	1	1	1
Colorado	1	1	1	1		
Montana	1		1			
Nevada	1	1	1	1	1	1
New York	3	2	2	1		
Pennsylvania	6	3	1			
Rhode Island	2	1	2	1	1	1
Texas	2	1	1	1	1	1
	42	20	17	8	7	7

MANUFACTURED GRAPHITE

Graphite is manufactured by the Acheson Graphite Company at Niagara Falls, N. Y. The figures given below, published by permission of this company, represent only the manufactured graphite that comes into competition with natural graphite.

Graphite Manufactured by the Acheson Graphite Company, 1918-1923, *in Pounds*

1918	9,182,272	1921	5,888,000
1919	8,163,177	1922	13,031,926
1920	7,399,749	1923	26,761,015

PRODUCERS

Flaketown Graphite Co., Mountain Creek, Alabama.
Pocahontas Graphite Co., Ashland, Alabama.
Ceylon Graphite Co., Hollins, Alabama. Office, Birmingham, Ala.

IRON ORE, PIG IRON AND STEEL

By Ernest F. Burchard and Hubert W. Davis*

General Review

THE production and shipments of iron ore increased 47 per cent and 38 per cent, respectively, in 1923 as compared with 1922. The production was the fourth largest on record, ranking about with that of 1918, and was 126 per cent of the average for the preceding five years and 119 per cent of the average for the preceding 10 years. The output of pig iron increased 48 per cent as compared with 1922 and was about 129 per cent of the average for the preceding 10 years and about 134 per cent of the average for the preceding five years. This output was the largest ever produced and was about 1,000,000 tons more than that of 1916, the largest previously recorded.

The average price per ton for iron ore at the mines increased about 11 per cent and that of pig iron at the blast furnaces about 12 per cent. The quoted prices of ferromanganese, spiegeleisen and steel showed considerable increases. In point of operations, production and earnings 1923 was the most remarkable peace-time year in the history of the steel industry.

The labor situation was fairly satisfactory in the Lake Superior iron-mining districts during the year, although early in the season mine labor was scarce and some of the mines went on a single shift, but this situation was relieved during the summer. A general wage advance of 10 per cent was made early in the spring. The movement toward the abolition of the 12-hour day in the steel industry made by the President of the United States at a conference with representative manufacturers in May, 1922, was followed by a serious effort on the part of the manufacturers to find ways and means to accomplish this end. A step in this direction was made on August 16, 1923, when the Carnegie Steel Company changed to the eight-hour day, and subsequently other producers took steps to abolish the long day.

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*Figures of imports and exports compiled by J. A. Dorsey, of the U. S. Geological Survey, from records of the Bureau of Foreign and Domestic Commerce.

The railroads were the leading buyers of steel in 1923, followed by the building and general construction industry, and there was also a good demand for steel by the oil and gas industries and for agricultural uses.

The total domestic output of pig iron probably required about 77 per cent of the apparent maximum capacity of the country, according to figures of the American Iron and Steel Institute, but this capacity was not utilized steadily, for at the beginning of 1923 there were only 263 furnaces in blast; on June 30 there were 335, and at the end of the year 239. The production of steel ingots is also considered to have utilized about 77 per cent of the manufacturing capacity, the output having ranged from about 60 per cent of the capacity in December to 89 per cent in May. The output of pig iron in the United States represented about 60 per cent of the world's production and nearly twice that of all the producing countries of Europe combined. The production of these European countries decreased about 3 per cent, compared with an increase of 48 per cent in the United States. Decreases in exports indicate that the United States is not contributing large quantities of iron and steel toward the rehabilitation of Europe, and increases in imports from war-stricken European countries indicate that their products are continuing to invade American markets.

A concise summary of the important features of the year, chiefly relating to the Lake Superior district, is given by Woodbridge,* as follows:

> The year in iron ore has been characterized by intensive production; remarkable co-ordination in transportation all the way from mines to furnaces, also co-operation between mines and railroads; an extension of projects for beneficiation of lean ores; almost a total lack of exploration for ore bodies in Minnesota and renewed activity elsewhere; an emphasis in the trend toward closer grading on manganese content, which had been more or less marked for some time; severe competition of imported ores along the Atlantic coast, which is usually served to some extent from Lake Superior; important all-rail shipments to furnaces in the Central West and South; freedom from labor troubles, and a good supply of men in all branches of the ore and transportation industry; a closer control of ores by larger organizations; the grinding out in Minnesota of smaller and independent holders of ore by the inexorable pressure of applied socialism; and the definite declaration of a policy for the bonusing of beneficiated ores produced in the Province of Ontario.

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*Woodbridge, D. E., Intensive Production of Lake Superior Ores; Iron Age, Jan. 3, 1924, p. 74.

IRON ORE

QUANTITIES MINED AND SHIPPED IN 1923

The quantities of iron ore shown in the accompanying table include beneficiated ore instead of crude ore mined if the ore is treated in any way. The quantities of ore, both mined and shipped, stated in the tables include the iron ore used for fluxing other metallic ores at smelters in the Western States, but the shipments do not include the iron ore sold for the manufacture of paint, which amounted in 1923 to 24,842 gross tons, valued at $140,306, or $5.65 a ton, compared with 27,382 tons, valued at $166,682, or $6.09 a ton, in 1922. The manganiferous iron ore (including ore used for flux), which contained 5 per cent or more of manganese, amounted to 1,433,897 gross tons, valued at $4,888,393. In Arkansas one producer shipped a small quantity of loadstone. This shipment, together with 8,209 gross tons of arsenical iron ore shipped in 1923, is not included in the tabulated statistics of iron ore.

Iron ore was mined in 20 States in both 1922 and 1923. All the iron ore produced in Idaho, Montana and Nevada and the greater part of that produced in California and Utah was used for flux; a small quantity of ore from New Jersey and Pennsylvania was used for purifying gas; the remaining States produced iron ore mainly for use in blast furnaces, except small quantities from California, Michigan, New York, Pennsylvania, Tennessee and Wisconsin that were used for paint. The rank of the three States producing the largest quantity of iron ore—Minnesota, Michigan and Alabama—remained practically unchanged. The Minnesota iron ranges are producing more iron ore than all the rest of the States together, having furnished nearly 61 per cent of the total for the United States in the last five years.

SOUTHEASTERN STATES

The activity in iron-ore mining in Birmingham, Chattanooga and other districts in Alabama, Tennessee, North Carolina and Georgia is shown in increases in 1923 ranging from 30 per cent in Alabama to 386 per cent in Georgia. Probably the most important change in mining methods that has been reported from this region was the introduction of mechanical loading devices in some of the underground red-ore mines of the Birmingham district. It is understood that these devices, which have not yet been described in the technical press, have proved successful in increasing the output of ore. Laboratory studies begun by the Bureau of Mines in 1921 have been continued, and the metallurgical laboratory at the University Experiment Station has been specially equipped for studies of concentration of the high-silica red ores.

The ores of iron are classed under the four heads hematite, brown ore, magnetite and carbonate.*

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*Notes concerning the composition of these ores are given in U. S. Geol. Survey Mineral Resources, 1916, pt. 1, pp. 537-541, 1918.

Iron Ore Mined in the United States in 1922 and 1923, by States and Varieties, in Gross Tons, With Percentage of Increase or Decrease in 1923

(Exclusive of ore containing 5 per cent or more of manganese)

State	Hematite	Brown ore	Magnetite	Carbonate	Total	Percentage of increase or decrease in 1923
1922						
Alabama	4,619,395	615,173			5,234,568	
California			3,204		3,204	
Colorado		513			513	
Georgia	120	24,029			24,149	
Idaho		200			200	
Michigan	10,453,578				10,453,578	
Minnesota	28,748,106		20,854		28,768,960	
Missouri	57,038	1,370			58,408	
Montana	*	*21,726			21,726	
Nevada		51			51	
New Jersey			90,359		90,359	
New Mexico			118,038		118,038	
New York	14,769		429,612		444,381	
North Carolina		12,958	4,321		17,279	
Pennsylvania		861	776,719	3,256	780,836	
Tennessee	74,928	81,536			156,464	
Utah	*	*6,355	8,663		15,018	
Virginia	12,161	18,810			30,971	
Wisconsin	575,828		1,196		577,024	
Wyoming	332,800				332,800	
	*44,888,723	*783,582	1,452,966	3,256	47,128,527	
1923						
Alabama	5,983,568	799,578			6,783,146	+30
California			2,779		2,779	—13
Colorado		4,102			4,102	+700
Georgia	21,193	96,128			117,321	+386
Idaho	1,290				1,290	+545
Michigan	14,174,468				14,174,468	+36
Minnesota	44,262,908		85,388		44,348,296	+54
Missouri	40,630	12,916			53,546	—8
Montana	*	*17,751			17,751	—18
Nevada		9,578			9,578	+18,680
New Jersey			307,733		307,733	+241
New Mexico			205,218		205,218	+74
New York	12,849		529,073		541,922	+22
North Carolina		13,899	45,785		59,684	+245
Pennsylvania		1,284	988,641	3,516	993,441	+27
Tennessee	165,630	101,645			267,275	+71
Utah	*2,700	*32,331	22,721		57,752	+285
Virginia	12,341	143,636			155,977	+404
Wisconsin	868,130		3,286		871,416	+51
Wyoming	378,747				378,747	+14
	*65,924,454	*1,232,848	2,190,624	3,516	69,351,442	+47

*Some hematite included with brown ore.

The ore reported as sold for fluxing other than in the manufacture of pig iron amounted to 86,869 gross tons, valued at $300,318, as compared with 40,155 tons, valued at $143,100, in 1922. The ore reported as sold for purifying gas amounted to 1,241 gross tons, valued at $11,285. The domestic iron ore sold for the manufacture of pig iron amounted to 69,723,362 gross tons, valued at $240,427,318, compared with 50,571,595 tons, valued at $157,657,188, in 1922.

Iron Ore Shipped From Mines in Alabama in 1922 *and* 1923

(Exclusive of ore containing 5 per cent or more of manganese and of ore sold for paint)

	1922		1923			
					Percentage of increase	
	Gross tons	Value	Gross tons	Value	Quantity	Value
Alabama	5,294,520	$ 8,791,069	6,922,663	$15,540,198	+31	+77

The Lake Superior district, comprising Minnesota, Michigan and Northern Wisconsin, mined about 85 per cent of the total ore in 1923, and the Birmingham district, in Alabama, mined a little less than 9 per cent of the total.

Iron Ore Mined in the United States, by Mining Districts and Varieties, in 1922 and 1923, in Gross Tons

(Exclusive of ore containing 5 per cent or more of manganese)

District	Hematite	Brown ore	Magnetite	Carbonate	Total	Percentage of increase in 1923
1922						
Lake Superior*	39,693,966	------	22,050	------	39,716,016	------
Birmingham	4,429,170	282,230	------	------	4,711,400	------
Chattanooga	250,083	122,121	------	------	372,204	------
Adirondack	------	------	406,342	------	406,342	------
Northern New Jersey and southeastern New York	------	------	113,629	------	113,629	------
Other districts	†515,504	†379,231	910,945	3,256	1,808,936	------
	†44,888,723	†783,582	1,452,966	3,256	47,128,527	------
1923						
Lake Superior*	59,196,734	------	88,674	------	59,285,408	49
Birmingham	5,740,233	306,675	------	------	6,046,908	28
Chattanooga	404,948	229,102	------	------	634,050	70
Adirondack	------	------	460,311	------	460,311	13
Northern New Jersey and southeastern New York	------	------	376,495	------	376,495	231
Other districts	†582,539	†697,071	1,265,144	3,516	2,548,270	41
	†65,924,454	†1,232,848	2,190,624	3,516	69,351,442	47

*Includes only those mines in Wisconsin which are in the true Lake Superior district.

†Some hematite included with brown ore.

STOCKS OF IRON ORE AT MINES

According to the reports of producers, the total quantity of iron ore in stock at the mines at the end of 1923 amounted to 10,165,875 gross tons, compared with 10,524,279 tons at the end of 1922, a decrease of 3 per cent. As the quantity of ore in stock piles is of necessity partly estimated, there are variations in the mine reports from year to year which prevent an absolute balance between the quantity mined, the quantity shipped, and the stocks on hand. The reported stocks at the end of 1923 were about 1,300,000 tons below the average for the preceding five years.

Stock of Iron Ore at Mines, by States, December 31, 1922 *and* 1923, *in Gross Tons*

State	1922	1923	State	1922	1923
Alabama	443,779	304,262	New Jersey	204,080	145,595
Georgia	120	155	New York	683,223	498,901
Idaho	175	—	Pennsylvania	3,069	4,408
Iowa	12,165	12,165	Virginia	62,441	10,022
Michigan	6,061,403	6,279,090	Wisconsin	297,628	256,319
Minnesota	2,750,916	2,651,879			
Missouri	5,280	3,079		10,524,279	10,165,875

PRICES OF IRON ORE PER TON

In the following table the average selling price at the mines of the different classes of iron ore in 1922 and 1923 is given for each of the producing States or groups of States, except where there were less than three shippers of a certain variety of ore in a State and permission was not given to publish the prices. These figures are taken directly from statements of the producers and probably represent the selling prices only approximately, as all the reports are not consistent: some of them evidently include merely mining costs; others contain, in addition, the cost of selling and insuring the ore; in others an allowance for sinking fund is included; and in still others the figures given are the costs charged against the blast furnaces. None of the reports, however, are supposed to include cost of freight.

The second following table summarizes the average prices of iron ore at mines beginning with 1912. Not until 1917 did the average price rise above $3 a ton, and the average for 1923, $3.45, is the third highest on record.

Average Price Per Gross Ton of Iron Ore at Mines in Alabama in 1922 and 1923

	Hematite		Brown ore		Magnetite	
	1922	1923	1922	1923	1922	1923
Alabama	$1.54	$2.16	$2.55	$2.89	....	....

Iron Ore Mines of Alabama That Produced More Than 100,000 Gross Tons Each in 1923

Rank	Name of mine	State	Nearest town	Variety of ore	Gross tons
1	Red Mountain group	Alabama	Bessemer	Hematite	3,174,215
2	Woodward Nos. 1, 2 and 3	Alabama	Bessemer	Hematite	884,694
3	Sloss Nos. 1 and 2	Alabama	Bessemer	Hematite	459,914
4	Raimund Nos. 1 and 2	Alabama	Bessemer	Hematite	431,865
5	Songo	Alabama	Bessemer	Hematite	320,033
6	Russellville	Alabama	Russellville	Brown ore	285,773
7	Shannon	Alabama	Birmingham	Hematite	159,591
8	Attalla No. 1	Alabama	Attalla	Hematite	139,110
9	Irondale Nos. 2 and 3	Alabama	Irondale	Hematite	138,583

PRODUCERS

The Alabama Co., Birmingham, Ala. Mines at Attalla, Nos. 1 and 2, Etowah County; Ironaton, Talladega County.

Republic Iron & Steel Co., Youngstown, Ohio. Mines at Raimund, Nos. 1 and 2, Jefferson County; Spaulding, Jefferson County; Tannehill and Houston, Tuscaloosa County.

Sloss-Sheffield Steel & Iron Co., Birmingham, Ala. Mines at Sloss Nos. 1 and 2, Irondale; Nos. 2 and 3, Jefferson County; Russellville, Franklin County; Compton, Blount County.

Tennessee Coal, Iron & Railroad Co., Birmingham, Ala. Mines at Fossil, Ishkooda, Muscoda, Jefferson County; Greeley, Tuscaloosa County.

Robinson Mining Co., Birmingham, Ala. Mines at Keewanee and Valley View No. 2, Jefferson County.

William Siglin, Bluffton, Ala. Mine at Bluffton, Cherokee County.

Woodward Iron Co., Woodward, Ala. Mines at Docray, Tuscaloosa County; Woodward Nos. 1, 2, 3 and Songo, Jefferson County.

Jenifer Iron Co., Jenifer, Ala. Mine at Jenifer, Talladega County.

Rock Run Iron Co., Rock Run, Ala. Mines at Langdon, Cherokee County.

Allen-Oden Ore Co., Birmingham, Ala. Mine at Mt. Pinson, Jefferson County.

Gulf States Steel Co., Birmingham, Ala. Mine at Shannon (Oxmoor), Jefferson County.

Alabama Fuel & Iron Co., Birmingham, Ala. Mine at Russellville, Franklin County.

Sheffield Iron Corp., D. A. Karr, Operator, Florence, Ala. Mine at Littleville, Franklin County.

Wilson & Lawler, Stahlman Bldg., Nashville, Tenn. Mine at Russellville, Franklin County.

Shelby Iron Co., Shelby, Ala. Mines at Shelby, Shelby County; Taits Gap, Blount County.

Central Iron & Coal Co., Holt, Ala. Mines at Valley View, Jefferson County; Friedman and Giles, Tuscaloosa County.

Jirama Ore Co., (J. W. Hammon, lessee). Mines at Tumlin Gap and Littleton, Etowah County.

Woodstock Operating Corporation. Mine at Woodstock-Rendalia, Talladega County.

Shook & Fletcher Supply Co. Mine at Taits Gap, Blount County.

Vardaman Bros. Mine at Welch, Talladega County.

W. J. Martin. Mine in Calhoun County.

S. A. Jackson. Mine in Etowah County.

C. S. Martin. Mine in Talladega County.

Smith-Howell Mines in Talladega and Cherokee Counties.

BENEFICIATED IRON ORE

The processes reported as employed in 1923 to improve the quality of the ore at mines were crushing and screening, drying by direct heat and by steam, hand picking on tables and on belts, washing by means of hydraulic jets and logs, jigging, electromagnetic separation, sintering, calcining, noduling and desulphurization by sintering. Some of the operations combined two or more of these processes. Iron ores were reported as beneficiated at 90 mines in 12 States in 1923 and at 83 mines in 12 States in 1922. Some iron ore is also recovered in the form of dust from blast furnaces, but no statistics have been gathered on this subject. Ore so recovered has been originally accounted for in the statistics of shipments from the mines.

The total beneficiated ore reported as shipped from mines in the United States in 1923 increased 61 per cent in quantity and 73 per cent in value, as compared with 1922. From such figures as are available to show the relation between crude ore treated and beneficiated ore recovered it is apparent that in washing brown ore the ratios, by weight, of crude ore washed to resultant concentrates are from 7:1 to 1.25:1, in concentrating hematite from 2.852:1 to 1.045:1, in magnetite from 3.458:1 to 1.073:1, and in carbonate 1.333:1.

Beneficiated Iron Ore Shipped From Mines in Alabama, 1922-23

	Variety	1922		1923	
		Gross tons	Value	Gross tons	Value
Alabama	Hematite, brown ore	803,369	$2,133,695	1,003,247	$2,938,692

IRON AND STEEL

The records of the production and sales of iron and steel shown in the following pages are derived in part from producers who report directly to the United States Geological Survey and in part from several other authoritative sources, such as the American Iron and Steel Institute, Metal Statistics, the Iron Age, the Iron Trade Review, and the Bureau of Foreign and Domestic Commerce of the Department of Commerce.

PIG IRON

SHIPMENTS, VALUE AND PRODUCTION, BY STATES

The shipments of pig iron, exclusive of ferroalloys, reported to the United States Geological Survey by the manufacturers represented an increase of 39 per cent in quantity and 56 per cent in gross value as compared with 1922. The values stated represent the approximate amounts received for the iron f.o.b. furnaces and do not include freight costs, selling commissions, and other items which are figured in some of the market prices of pig iron as published in the trade journals.

The pig iron shipped includes the metal produced from foreign as well as from domestic ore. The pig iron derived from ore imported from Africa, Algeria, Brazil, Canada, Chile, Cuba, Greece, Newfoundland, Spain and Sweden, although it constitutes a very small percentage of the total production, amounted in 1923 to 1,178,756 gross tons, valued at $33,376,286, as compared with 649,111 tons, valued at $13,640,340, in 1922. In the manufacture in 1923 of 1,265,160 gross tons of pig iron, 2,126,458 gross tons of foreign ore, including 42,364 tons of cinder derived from foreign pyrite, was reported to have been used, thus indicating an average pig iron yield of 59.50 per cent from imported ore. Domestic ore, including 5,334,084 gross tons of cinder, scale and scrap and amounting to 74,606,663 gross tons, was reported as used in the manufacture of 38,502,322 tons of pig iron, thus indicating a yield of 51.61 per cent in pig iron from domestic materials. The total production of pig iron, exclusive of ferroalloys, reported to the Geological Survey was 39,767,482 gross tons, compared with 26,826,210 tons in 1922, an increase of 48 per cent.

Pig Iron Shipped From Blast Furnaces in Alabama, 1922-1923

	1922		1923			
					Percentage of increase or decrease	
	Gross tons	Value	Gross tons	Value	Quantity	Value
Alabama	2,223,159	$42,883,424	2,784,625	$64,912,809	+25	+51

Pig Iron Shipped From Blast Furnaces in the United States in 1922 and 1923, by Grades

Grade	1922			1923		
	Gross tons	Value	Average price	Gross tons	Value	Average price
Charcoal	232,244	$6,447,924	$27.76	253,544	$7,834,835	$30.90
Foundry	3,877,201	85,587,682	22.07	5,492,429	137,330,641	25.00
Basic	14,359,461	306,257,984	21.33	19,699,027	468,716,847	23.79
Bessemer	7,723,335	175,082,881	22.67	10,993,132	281,730,764	25.63
Low-phosphorus	152,023	4,359,606	28.68	209,014	6,350,833	30.38
Malleable	1,036,786	23,521,993	22.69	1,343,370	35,338,854	26.31
Forge	211,601	5,063,516	23.93	268,217	6,802,884	25.36
All other (not ferroalloys)	78,087	1,823,272	23.35	102,646	2,693,720	26.24
	27,670,738	608,144,858	21.98	38,361,379	946,799,378	24.68

The American Iron and Steel Institute reports that the output in 1923 of all kinds of pig iron, including ferroalloys, produced in blast furnaces, as well as some that was electrically produced, increased 13,141,242 tons, or 48 per cent, as compared with 1922.

Pig Iron, Including Ferroalloys, Manufactured in the United States in 1922 *and* 1923, *in Gross Tons**

State	1922	1923	State	1922	1923
Pennsylvania	9,731,788	14,804,620	Virginia	49,024	276,874
Ohio	6,484,162	9,347,960	Missouri Iowa Washington	266,716	321,436
Illinois	2,625,244	3,839,063	Maryland	366,967	529,606
Alabama	2,230,619	2,797,190	Tennessee	123,907	250,982
Indiana Michigan	2,726,727	3,813,125	Connecticut Massachusetts	1,084	1,309
New York New Jersey	1,772,325	2,951,810			
Wisconsin Minnesota	381,030	724,717		27,219,904	40,361,146
West Virginia Kentucky	460,311	702,454			

*American Iron and Steel Institute.

AVERAGE PRICES

PRICES AT BLAST FURNACES

The average prices of all kinds of pig iron given in the following table are based on reports of the manufacturers to the Geological Survey. The figures represent the approximate prices f.o.b. at the blast furnaces and do not include the prices of ferroalloys. The general average price for all grades of pig iron at the furnaces, exclusive of ferroalloys, showed an increase of 12 per cent for 1923.

Average Price Per Gross Ton of Pig Iron at Blast Furnaces in Alabama, 1918-1923

	1918	1919	1920	1921	1922	1923
Alabama	$30.58	$25.96	$32.70	$24.33	$19.29	$19.73

Average Monthly Prices Per Ton of Principal Grades of Pig Iron, 1922 *and* 1923*

Month	Foundry pig iron at Valley furnaces		Foundry pig iron, Birmingham furnaces		Bessemer pig iron at Valley furnaces		Basic pig iron at Valley furnaces	
	1922	1923	1922	1923	1922	1923	1922	1923
January	$19.38	$27.00	$15.96	$23.23	$19.62	$27.50	$18.19	$25.00
February	18.92	27.21	15.33	24.29	19.40	27.75	18.00	25.67
March	18.87	30.00	15.31	26.33	19.02	29.94	17.89	29.44
April	20.74	31.00	15.74	27.00	20.88	31.00	19.98	31.00
May	24.00	30.69	17.63	27.00	25.08	30.23	24.62	29.33
June	24.00	28.04	18.44	25.63	25.00	28.73	25.00	26.85
July	24.20	25.70	18.56	25.00	25.00	26.82	24.32	25.12
August	29.04	25.00	20.37	23.37	27.74	26.50	26.17	25.00
September	35.02	24.96	25.40	22.81	33.76	26.50	30.08	24.92
October	31.63	23.76	27.04	20.11	33.23	25.33	30.23	24.00
November	28.78	21.84	24.12	19.04	31.70	23.82	28.28	21.20
December	25.92	21.96	22.70	20.36	27.78	23.00	24.96	20.96
Average	25.04	26.43	19.72	23.68	25.68	27.26	23.98	25.71

*Metal Statistics, 1924.

The number of furnaces in blast on June 30 and December 31 and the total number of stacks recorded for 1922 and 1923, not including any electric reduction furnaces, are as follows:

Blast Furnaces in the United States, 1922 *and* 1923

State	In blast June 30, 1922	Dec. 31, 1922			In blast June 30, 1923	Dec. 31, 1923		
		In	Out	Total		In	Out	Total
Pennsylvania	69	90	70	160	125	87	63	150
Ohio	41	58	22	80	67	48	29	77
Illinois	16	18	8	26	24	17	9	26
Alabama	22	25	18	43	30	23	20	43
New York	13	15	12	27	24	18	10	28
Virginia	------	4	13	17	6	3	14	17
Tennessee	2	6	11	17	7	2	15	17
Colorado	3	3	2	5	3	2	3	5
Missouri	------	------	3	3	------	------	3	3
Oregon	------	------	1	1	------	------	------	------
Maryland	4	4	3	7	5	4	2	6
New Jersey	1	1	3	4	2	2	2	4
Wisconsin	3	4	3	7	5	1	6	7
Minnesota	2	3	------	3	3	3	------	3
Indiana	12	14	2	16	16	14	2	16
Michigan	9	13	------	13	12	11	2	13
West Virginia	2	3	2	5	4	3	1	4
Kentucky	2	1	6	7	2	1	6	7
Georgia	------	------	3	3	------	------	1	1
Texas	------	------	1	1	------	------	1	1
Mississippi	------	------	1	1	------	------	1	1
Connecticut	------	------	2	2	------	------	2	2
Massachusetts	------	1	------	1	------	------	1	1
	201	263	186	449	335	239	193	432

STEEL

PRODUCTION

The following tables showing the production of steel were compiled by the American Iron and Steel Institute. No data whatever are available on the value of the output of crude steel at the mills, but the weekly issues and annual statistical reviews of the Iron Age give market quotations of prices of steel billets and some of the leading forms of finished steel. The price of Bessemer steel billets at Pittsburgh in 1923 ranged from $37.30 to $45 a gross ton; in 1922 it ranged from $28 to $40. Tank plates at Pittsburgh ranged from 2.06 to 2.50 cents a pound in 1923 and from 1.39 to 2.13 cents in 1922. Steel beams at Pittsburgh ranged from 2.06 to 2.50 cents a pound in 1923 and from 1.39 to 2 cents in 1922.

Bessemer Steel Ingots and Castings Manufactured in the United States, 1919-1923, *in Gross Tons*

State	1919	1920	1921	1922	1923
Ohio	3,073,941	3,662,718	1,581,610	2,324,425	3,557,579
Pennsylvania	2,851,402	3,279,023	1,665,456	2,474,956	3,115,840
Illinois	906,324	1,243,837	532,539	707,067	1,057,576
Other States	439,895	697,509	236,333	412,850	753,093
	7,271,562	8,883,087	4,015,938	5,919,298	8,484,088

Open-Hearth Steel Ingots and Castings Manufactured in the United States, 1919-1923, *in Gross Tons*

State	1919	1920	1921	1922	1923
New England States	286,826	290,967	102,642	204,343	268,630
New York and New Jersey	1,296,005	2,010,895	634,290	1,597,881	1,951,278
Pennsylvania	12,692,112	14,184,477	6,408,043	11,583,812	14,428,187
Ohio	5,112,616	6,341,016	3,108,332	6,770,293	7,786,820
Indiana	3,122,486	3,785,056	2,308,414	3,571,397	4,326,724
Illinois	1,664,993	2,302,776	1,093,268	2,077,920	2,579,095
Other States	2,773,656	3,756,708	1,934,813	3,503,337	4,558,923
	26,948,694	32,671,895	15,589,802	29,308,983	35,899,657

According to these tables, there were increases of 43 per cent in the production of Bessemer steel and of 22 per cent in open-hearth steel in 1923 compared with 1922. In the total production of steel there was an increase of 26 per cent. Of the total output in 1923, nearly 80 per cent was represented by open-hearth steel, nearly 19 per cent by Bessemer steel, and a little more than 1 per cent by all other classes of steel.

Of the total output of open-hearth steel, 34,665,021 gross tons was made by the basic process and 1,234,636 tons by the acid process, compared with 28,387,171 tons of basic steel and 921,812 tons of acid steel in 1922.

The production of steel by the electric process in 1923 showed an increase of 49 per cent as compared with 1922.

Steel Electrically Manufactured in the United States, 1909 *to* 1923, *in Gross Tons*

Year	Ingots	Castings	Total	Year	Ingots	Castings	Total
1909	13,456	306	13,762	1917	239,632	64,911	304,543
1910	50,821	1,320	52,141	1918	403,068	108,296	511,364
1911	27,227	1,878	29,105	1919	272,942	111,510	384,452
1912	14,147	4,162	18,309	1920	346,956	155,196	502,152
1913	20,973	9,207	30,180	1921	84,404	85,095	169,499
1914	15,458	8,551	24,009	1922	191,057	154,982	346,039
1915	46,348	23,064	69,412	1923	279,914	235,958	515,872
1916	126,048	42,870	168,918				

In the total production of electric steel in 1923 are included 194,976 tons of alloy-steel ingots and castings which were alloyed with nickel, vanadium, tungsten, chromium, molybdenum and other metals (165,922 tons of ingots and 29,054 tons of castings), compared with 125,419 tons (107,659 tons of ingots and 17,760 tons of castings) so alloyed in 1922.

On December 31, 1923, the number of completed plants equipped for the manufacture of steel by the electric process was 203, the same number as at the end of 1922.

Steel Produced in the United States, 1810-1923, *in Gross Tons*

Year	Bessemer	Open-hearth	Crucible	Other steel	Total
1810-1870	58,482	2,232	146,370		207,084
1871	40,179	1,785	31,250		73,214
1872-1880	4,293,896	245,035	349,730	76,009	4,964,670
1881-1890	21,596,699	2,387,925	703,489	37,044	24,725,157
1891-1900	49,387,341	15,392,764	762,446	35,820	65,578,371
1901-1910	94,048,698	92,418,814	1,051,379	154,683	187,673,574
1911-1915	42,329,520	98,833,090	544,047	185,692	141,892,349
1916	11,059,039	31,415,427	129,692	169,522	42,773,680
1917	10,479,960	34,148,893	126,716	305,038	45,060,607
1918	9,376,236	34,459,391	115,112	511,693	44,462,432
1919	7,271,562	26,948,694	63,572	387,404	34,671,232
1920	8,883,087	32,671,895	72,265	505,687	42,132,934
1921	4,015,938	15,589,802	7,613	170,444	19,783,797
1922	5,919,298	29,308,983	28,606	346,039	35,602,926
1923	8,484,088	35,899,657	44,079	515,872	44,943,696

LIME

By G. F. Loughlin and A. T. Coons

General Conditions

THE sales of lime manufactured in the United States in 1923 were 12 per cent greater than those of 1922, which had shown an increase of 44 per cent over those of 1921, a year of depression in the building and chemical industries of the country. All the principal producing States except Maryland showed increases in production in 1923. The quantity of lime sold for construction work and for chemical use increased, but that sold for the liming of land decreased. The number of plants reporting operations was 63 less than in 1922. This decrease was principally in Pennsylvania, Virginia, Maryland and West Virginia, where lime is burned by farmers or small operators for local consumption. Production of this type has been falling off for several years, on account of the cost of fuel and scarcity of labor. Ohio retained her position, established in 1922, as the leading State in the production of lime, and Pennsylvania ranked second. The growth of the industry in Ohio is due chiefly to the increased output of hydrated lime used for building. In Pennsylvania, which was prior to 1922 the leading State, there has been during the last few years a decided decrease in the output of lime manufactured for use in agriculture and insufficient increase in the sale of lime for chemical and structural uses to offset this loss. During 1923 many improvements were made at plants and kilns in order to reduce the cost of labor to a minimum and to increase efficiency. Wages were high throughout the year, and at times, especially in the Summer, common labor was difficult to obtain. The cost of operation was generally higher than in 1922, although coal was more plentiful and somewhat cheaper. The average value, at the plants, of lime sold increased from $9.14 a ton in 1922 to $9.81 in 1923, although many reports showed prices about the same or lower than in 1922.

PRODUCTION

Lime Sold by Producers in the United States, 1921-1923

Year	Short tons	Value*		Number of plants in operation
		Total	Average	
1921	2,532,153	$24,895,370	$9.83	520
1922	3,639,617	33,255,039	9.14	530
1923	4,076,243	39,993,652	9.81	467
Percentage of increase or decrease in 1923	+12	+20	+7	—12

*The value given represents the value of bulk lime f.o.b. at point of shipment and does not include cost of barrel or package.

Lime Sold by Producers in Alabama, 1922 *and* 1923

	1922			1923		
	Number of plants in operation	Short tons	Value	Number of plants in operation	Short tons	Value
Alabama	11	168,135	$ 979,331	12	193,429	$1,627,539

Lime Sold by Producers in Alabama in 1923, by Uses

	Building		Agricultural		Chemical uses												Total	
					Paper mills		Glass works		Sugar refineries		Tanneries		Metallurgy		Other chemical uses			
	Short tons	Value	Short tons	Value	Short tons	Value	Short tons	Value	Short tons	Value	Short tons	Value	Short tons	Value	Short tons	Value	Short tons	Value
Alabama	50,606	$436,973	....	....	*	*	....	....	....	....	*	*	*	*	33,884	$279,591	193,429	$1,627,539

*Included under "Undistributed."

Building Lime—The output of lime for construction work, which had increased 49 per cent in 1922, showed an increase of 15.5 per cent in 1923. The demand for lime for building enterprises was moderately good during the first part of the year, but the general curtailment of construction that shortly followed and the rise in prices of some building materials and of labor had its effect on the total sales for the year. The leading States—Ohio, Pennsylvania and Wisconsin—showed increases in output of 12, 23 and 27 per cent, respectively.

Chemical Lime—The output of chemical lime in 1923 showed an increase of 16 per cent over that of 1922, or practically the same increase as building lime. This followed an increase of 53 per cent in 1922 when the chemical industry was recovering from the industrial depression of 1921.

Agricultural Lime—The total sales of lime for agriculture decreased 12 per cent in 1923, and Virginia and West Virginia were the only important States to show increases. Pennsylvania, the principal producing State, showed a decrease of 19 per cent, and Ohio and Maryland also showed decreases. The decline in output is ascribed to the inability of the farmers to buy lime, the high cost of fuel and labor and scarcity of common labor. Ground limestone for this purpose, which for several years increased in output as burned lime decreased, has also decreased since 1919, but in 1923 it increased 7 per cent. Sales of calcareous marl for agriculture increased 47 per cent, but sales of oyster-shell lime decreased 40 per cent.

Agricultural Lime Sold by Producers in the United States, 1922-23, by Kinds

Kind	Short tons		Value	
	Gross	Effective lime content	Total	Average
1922				
Lime from limestone:				
Quicklime	122,303	102,700	$750,188	$6.13
Hydrated	150,423	105,300	1,254,894	8.34
Lime from oyster shells	31,439	26,400	248,911	7.92
Limestone (pulverized)	1,195,000	513,850	2,150,435	1.80
Calcareous marl	67,777	29,100	203,196	3.00
1923				
Lime from limestone:				
Quicklime	109,108	91,600	648,882	5.95
Hydrated	131,443	92,000	1,176,637	8.95
Lime from oyster shells	18,820	15,800	138,530	7.36
Limestone (pulverized)	1,278,770	549,870	2,160,249	1.69
Calcareous marl	99,410	42,700	328,932	3.31

The method by which the effective lime content of the different forms of land lime is calculated was set forth in Mineral Resources for 1921.

Detailed statistics of pulverized limestone sold for agriculture in 1923 will be found in the annual report on stone. All the calcareous marl sold in the United States in 1923 was used for liming the soil. Virginia produced 36,937 short tons, valued at $87,714, and California 18,303 short tons, valued at $109,437.

HYDRATED LIME

The statistics of the output of hydrated lime include only the product made in hydrating machines and omit hand-slacked lime. There were seven more plants reported as producing hydrated lime in 1923 than in 1922. Hydrated lime increased 11 per cent in quantity and 24 per cent in value in 1923.

Hydrated Lime Sold by Producers in the United States, 1921-23

Year	Short tons	Value		Number of plants in operation
		Total	Average	
1921	792,970	$7,421,637	$9.36	105
1922	1,106,063	9,868,980	8.92	114
1923	1,225,928	12,229,598	9.98	121

Hydrated Lime Sold by Producers in Alabama, 1922 *and* 1923

	1922		1923	
	Short tons	Value	Short tons	Value
Alabama	15,016	$140,698	19,526	$173,571

CONSUMPTION

In the following table the consumption of lime is estimated by subtracting from the production the quantities reported shipped by producers out of their States and adding the quantities reported shipped in by producers in other States. No account is taken of jobbers' or dealers' interstate business, nor of producers', jobbers', dealers', or consumers' stocks, which are quite unknown. Imports and exports are also ignored, but these are insignificant. The estimates are therefore not precise, but they afford the best approximations possible. On this basis almost all the States showed the same or a slightly higher per capita consumption in 1923, and the average for the country was higher. The lime produced in Ohio is more widely shipped than that from any other State; that of Missouri and Pennsylvania has the next widest distribution.

Lime Consumed in Alabama in 1923, *in Short Tons*

	Sales	Shipments from State	Shipments into State	Consumption					Population Jan. 1, 1924*
				Quicklime	Hydrated lime	Total	Pounds per capita		
							1922	1923	
Alabama	193,429	47,432	5,887	140,029	11,855	151,884	110	125	2,434,731

*Estimated by Bureau of the Census.

PRODUCERS

BLOUNT COUNTY

Cheney Lime Company.

DE KALB COUNTY

Alabama Lime Works. W. L. Buckels.

JACKSON COUNTY

Alabama-Tennessee Lime Company.

JEFFERSON COUNTY

Tennessee Coal, Iron and R. R. Company.

SHELBY COUNTY

Calera Lime Works; Newala Lime Works; Keystone Lime Works; O'Neal's Lime Works; Long View Lime Works; Saginaw Lime & Stone Co.; Superior Lime & Hydrate Co.

MANGANESE AND MANGANIFEROUS ORES

By Helena M. Meyer

ALABAMA had a small production of manganese ore for the year 1923, the details of which are given in the following table:

Manganese and Manganiferous Ore (Exclusive of Fluxing Ore) Shipped From Mines in Alabama in 1922 and 1923

Year	Ore containing 35 per cent of manganese or more			Ore containing 10 to 35 per cent of manganese			Ore containing 5 to 10 per cent of manganese		
	Shippers	Gross tons	Value	Shippers	Gross tons	Value	Shippers	Gross tons	Value
1922	----	----	----	1	475	$1,900	----	----	----
1923	1	*	*	4	694	$8,067	----	----	----

*Not at liberty to publish.

PRODUCERS

J. A. Clifford, Goshen mine, Cherokee County.
J. R. Cook, J. A. Cook mine, Etowah County.
R. W. Stockdale.
F. S. Norwood.
D. A. Oden.

MICA

By Walter B. Jones

THERE was no production of mica reported from Alabama in 1923. This industry has been declining for several years, but 1923 is the first year in which there was no production. Anyone interested in the distribution of mica in Alabama is referred to the following report:

Mica Deposits of Alabama, by G. H. Clark, Assistant Geologist, 115 pp., 1921. Published by the Alabama Geological Survey.

MINERAL WATERS

By W. D. Collins*

Scope of Report

THE term mineral water as it is used in this report applies to water that is bottled and sold in its natural state or only slightly altered from its natural state. It includes (a) natural carbonated waters that have lost part of their carbon dioxide; (b) natural waters that have been artificially carbonated; and (c) waters from which iron has been removed. It does not include artificial waters or natural waters that have been essentially modified in chemical character. Waters that have been flavored, concentrated, fortified, diluted, or otherwise radically altered are therefore not included.

The statistics in this report refer only to domestic mineral waters that have been sold, imports being excepted. Water that is given away, including water furnished free for drinking or bathing to guests at hotels or to patients at sanitariums, has been omitted even where there are data available to show the quantity of water so used. Hence, as actual sales fall far short of the total quantity used, particularly of such waters as are drunk at fashionable resorts for their medicinal value, the totals do not represent the full magnitude of the trade.

Three uses of mineral waters are recognized in this report—table use, medicinal use, and use in manufacture of soft drinks—but the quantity and value of water used in the manufacture of soft drinks are not included in the totals. In former reports the springs whose waters were used only for making soft drinks were included in the number of producing springs. In this report such springs are enumerated separately.

The distinction for statistical purposes between table and medicinal waters is entirely arbitrary and is based on the reports furnished by the owners and operators of springs stating the uses for which the waters are sold.

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*The statistics showing production were compiled by Mrs. E. R. Phillips of the United States Geological Survey.

Domestic Mineral Waters Sold in Alabama in 1922 *and* 1923

	1922			1923			Percentage of increase or decrease	
	Commercial springs	Gallons	Value	Commercial springs	Gallons	Value	Quantity	Value
Alabama	4	5,389	$875	4	4,878	$763	—9	—13

PRODUCERS

(Also showing hotel and bathing accommodations)

Spring or well	Location		Bathing establishment (B) and hotel (H), with capacity (number of guests)
	County	Nearest post office	
Healing Springs	Healing Springs	Washington	H (70)
Matchless Mineral Wells	Greenville	Butler	
Shocco Springs	Talladega	Talladega	H (35)
White Sulphur Wells	Jackson	Clarke	B, H (100)

SAND AND GRAVEL

By A. T. Coons

PRODUCTION

THE sand and gravel sold or used by the producers in the United States in 1923 amounted to 139,932,153 short tons and was valued at $90,903,654. These figures show an increase of about 48 per cent in quantity and 41 per cent in value over those for 1922. There was a general increase in both the quantity and the value of all classes of this material except in the value for filter sand. A special canvass of railroad companies was made in 1923 in order to obtain more complete reports of non-commercial material used by them, and the figures obtained make up in part the large increase (146 per cent) shown in the quantity of gravel for railroad ballast. The sand and gravel for use in the construction of buildings and pavements also showed a large increase. Sand for molding increased 45 per cent. The figures for 1923 include returns obtained from 2,428 sand and gravel plants, which is 443 more than the number represented by the figures for 1922.

The production of sand and gravel reported for 1923 is approximately double that for 1919.

Sand and Gravel Sold or Used by the Producers in the United States, 1919-1923

Year	Sand		Gravel (including railroad ballast)		Total	
	Short tons	Value	Short tons	Value	Short tons	Value
1919	35,969,736	$26,389,679	34,606,671	$19,561,877	70,576,407	$45,951,556
1920	43,776,142	39,198,614	38,265,246	26,462,991	82,041,388	65,661,605
1921	38,294,954	*29,049,950	41,550,054	27,434,295	79,845,008	56,484,245
1922	49,694,923	35,469,920	45,172,123	29,147,744	94,867,046	64,617,664
1923	67,365,271	48,473,565	72,566,882	42,430,089	139,932,153	90,903,654
Per cent of increase in 1923 over 1922	36	37	61	46	48	41

*Revised figures.

Sand and Gravel Sold or Used by the Producers in the United States in 1922 and 1923, by Uses

Use	1922		1923	
	Short tons	Value	Short tons	Value
Sand:				
Glass	1,768,549	$2,866,366	2,034,958	$3,751,778
Molding	3,839,116	4,478,405	5,559,644	6,730,417
Building	29,375,466	17,574,579	39,234,762	23,751,244
Paving	10,669,772	6,481,601	15,632,419	9,187,468
Grinding and polishing	1,183,161	1,732,469	1,456,039	2,361,695
Fire or furnace	237,065	336,085	307,794	445,479
Engine	1,685,712	1,288,022	2,033,494	1,535,638
Filter	71,728	142,692	116,520	139,671
Other	864,354	569,701	989,641	570,175
	49,694,923	35,469,920	67,365,271	48,473,565
Gravel:				
Building	18,686,176	14,541,169	24,145,463	18,367,713
Paving	17,432,445	11,373,712	26,174,112	17,716,779
Railroad ballast	9,053,502	3,232,863	22,247,307	6,345,597
	45,172,123	29,147,744	72,566,882	42,430,089
Grand total	94,867,046	64,617,664	139,932,153	90,903,654

Sand and Gravel Sold or Used by the Producers in Alabama in 1922 and 1923

Alabama	Plants reporting	Sand		Gravel		Total	
		Short tons	Value	Short tons	Value	Short tons	Value
1922	14	443,180	$217,377	405,563	$129,543	848,743	$346,920
1923	22	743,494	309,355	1,086,065	450,881	1,829,559	760,236

Sand and Gravel Sold or Used by the Producers in Alabama in 1923, by Uses

	Glass sand		Molding sand		Building sand		Grinding and polishing sand		Fire or furnace sand		Engine sand		Paving sand	
	Short tons	Value	Short tons	Value	Short tons	Value	Short tons	Value	Short tons	Value	Short tons	Value	Short tons	Value
Alabama	....	....	40,138	$19,413	658,706	$265,642	*	*	....	....	3,000	$1,800	40,500	$21,750

	Filter sand		Other sands		Building gravel		Paving gravel		Railroad ballast		Total	
	Short tons	Value	Short tons	Value	Short tons	Value	Short tons	Value	Short tons	Value	Short tons	Value
Alabama	*	*	....	....	268,283	$245,582	341,227	$145,660	476,555	$59,639	1,829,559	$760,236

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*Included under "Undistributed."

PRICES

The only figures relating to prices of sand and gravel compiled by the Geological Survey are those shown in the following table, which represent the total average values of the different grades of sand and gravel. They serve, however, as an index of the price changes in recent years, which have had a general upward trend from 1917 through 1920, followed by a downward trend to 1923, when some of the grades again showed an upward trend. The total average value in 1923 was 3 cents less per ton than in 1922, principally because an extended canvass of railroad companies was made to ascertain the quantity of non-commercial ballast used by them and this material was included in the total at a low unit value.

Average Value Per Short Ton of Sand and Gravel Sold or Used by the Producers in the United States, 1917-1923

(Based on amounts received for sales f.o.b. pits or nearest shipping points)

Kind	1917	1918	1919	1920	1921	1922	1923
Glass sand	$1.38	$1.94	$1.97	$2.19	$1.81	$1.62	$1.84
Molding sand	.92	1.04	1.10	1.46	1.29	1.17	1.21
Building sand	.39	.50	.56	.68	.65	.60	.61
Grinding and polishing sand	1.04	1.60	1.34	1.80	1.61	1.46	1.62
Fire or furnace sand	1.15	1.48	1.23	1.81	1.56	1.42	1.45
Engine sand	.59	.76	.77	.82	.86	.76	.76
Paving sand	.41	.54	.66	.68	.63	.61	.59
Filter sand	.76	1.47	1.48	1.27	1.11	1.99	1.20
Railroad ballast	.17	.22	.30	.32	.33	.36	.29
Gravel (exclusive of railroad ballast)	.46	.57	.66	.81	.75	.72	.72
All sand and gravel	.46	.61	.65	.80	.71	.68	.65

PRODUCERS

ELMORE COUNTY

Underwood-Walker Co., Birmingham, Ala. Pits at Jackson's Lake.
Kirkpatrick Sand & Cement Co., Birmingham, Ala.
Premier Sand and Gravel Co., 610 Woodward Bldg., Birmingham, Ala.

ESCAMBIA COUNTY

Pensacola Gravel Co.

ETOWAH COUNTY

W. P. Clayton, Gadsden, Ala. Pits at Alabama City, Ala.

FRANKLIN COUNTY

Spruce Pine Sand & Gravel Co., Spruce Pine, Ala.

JEFFERSON COUNTY

Southern Gravel Co., Birmingham, Ala.
J. M. Acton, Trussville, Ala.

MACON COUNTY

Chehaw Sand Gravel & Manufacturing Co., Atlanta, Ga.

MOBILE COUNTY

Mobile-Gulf Navigation Co., Mobile, Ala.

MONTGOMERY COUNTY

Central of Georgia R. R.
Atlantic Coast Line Ry. Co., Wilmington, N. C.
Mitylene Gravel & Sand Co., Albany, Ga.
Alabama Sand & Gravel Co.
Rogers & Knight.
Good Roads Gravel Co.

ST. CLAIR COUNTY

Carreker Bros. & Co., Cook Springs, Ala.
H. E. Riggan, Cook Springs, Ala.
L. E. Shurbet, Cooks Springs, Ala.
D. W. Moody.
Baker Tow Boat Co., Tuscaloosa, Ala.
Baker Land & Gravel Co., Inc., Tuscaloosa, Ala.
J. W. Thompson, Tuscaloosa, Ala.

STONE

By G. F. Loughlin and A. T. Coons

PRODUCTION

THE sales of stone in the United States in 1923 were the largest ever recorded. There was an increase of 29 per cent in quantity and of 31 per cent in value. All varieties of stone showed increases.

The tables of this report give quantities and values f.o.b. at quarries and mills as far as it is possible to obtain them. Stone quarried and used by the producer is considered as sold and is included in the figures given. This report does not, however, include the stone manufactured into abrasives (grindstones and pulpstones), glass sand, lime and cement and reported in terms of finished product. These products are treated in the chapters on abrasives, sand and gravel, lime, and cement.

A fairly active demand prevailed throughout 1923 for stone of all kinds, and conditions at the quarries were better than in 1922. There were practically no strikes, and more cars were available for transportation, especially for crushed stone, than for several years. Labor was scarce and wages were high, yet, owing to improved methods and economies in operation, the cost of quarrying apparently remained about the same as in 1922. Prices varied, the average being higher for some kinds of stone and lower for others.

Stone Sold or Used by the Producers in Alabama, 1922 *and* 1923

	1922			1923		
	Number of active plants	Short tons (approximate)	Value	Number of active plants	Short tons (approximate)	Value
Alabama	21	*863,910	*$828,435	28	*1,299,160	*$1,401,693

*To avoid disclosing confidential information, certain State totals are slightly incomplete, the figures not included being combined under "Undistributed."

MARBLE

SUMMARY

There was an increase of over 31 per cent in the quantity and 22 per cent in the value of the total output of marble in 1923. The quantity of building stone increased 24 per cent and the monumental stone 30 per cent.

The average value per cubic foot for all classes of marble building stone except that sold for dressed interior work decreased. There was also a decrease in the average value of monumental stone. The amount of marble sold as by-products from the quarries represents about 46 per cent of the total output. This is sold as crushed stone, fluxing stone, marble "flour," terrazzo, mosaic, stucco, etc.

Marble Sold by the Producers in the United States, 1922-1923, *by Uses*

Use	1922			1923		
	Quantity	Value		Quantity	Value	
		Total	Average		Total	Average
Building stone:						
Rough—						
Exterior cubic feet	174,550	$393,687	$2.26	230,460	$456,022	$1.98
Interior do.	632,870	1,487,174	2.35	616,920	1,438,011	2.33
Dressed—						
Exterior do.	488,950	1,728,206	3.53	679,440	1,992,346	2.93
Interior do.	667,390	3,313,316	4.96	901,860	4,574,914	5.07
Total exterior do.	663,500	2,121,893	3.20	909,900	2,448,368	2.69
Total interior do.	1,300,260	4,800,490	3.69	1,518,780	6,012,925	3.96
Total building stone do.	*1,963,760	*6,922,383	3.53	*2,428,680	*8,461,293	3.48
Monumental stone;						
Rough do.	341,740	749,738	2.19	147,690	170,402	1.15
Dressed do.	547,440	2,388,040	4.36	1,005,060	3,561,371	3.54
Total monumental stone do.	*889,180	*3,137,778	3.53	*1,152,750	*3,731,773	3.24
Total building and monumental:						
Cubic feet	2,852,940	10,060,161	3.53	3,581,430	12,193,066	3.40
Approximate short tons	242,670	———	———	303,760	———	———
Marble for other uses (by-products), short tons	185,200	474,510	2.56	258,800	670,908	2.59
Total marble, approximate short tons	427,870	10,534,671	———	562,560	12,863,974	———

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*Building stone figures may be somewhat less than given and monumental stone somewhat more, as some of the Tennessee producers were unable to divide their product according to use.

Marble Sold by the Producers in Alabama, 1922-1923

(Quantities approximate)

	1922		1923	
	Short tons	Value	Short tons	Value
Alabama	*25,850	*$591,971	†24,970	†$958,189

*Alabama includes Arkansas, New Mexico and Texas.
†Alabama includes Arkansas.

PRODUCERS

The Alabama Marble Co., 916 Bell Bldg., Montgomery, Ala. Quarry in Talladega County, Alabama.

Moretti-Harrah Marble Co., Sylacauga, Ala. Quarry at Sylacauga, Talladega County, Alabama.

LIMESTONE

SUMMARY

The output of limestone as shown in this report was 30 per cent more in 1923 than in 1922. All the important items showed increases. Building stone increased 16 per cent, crushed stone 26 per cent, fluxing stone 37 per cent, agricultural limestone 7 per cent, and limestone for miscellaneous uses, chiefly manufacturing industries, 39 per cent.

Limestone Sold or Used by the Producers in the United States, 1922 and 1923, by Uses

Use	1922		1923	
	Quantity	Value	Quantity	Value
Building stone, cubic feet	*12,617,380	*$12,418,873	*14,639,950	*$16,221,095
Approximate equivalent in short tons	*955,540	—	*1,099,390	—
Curbing, flagging and paving, cubic feet	*	*	75,070	46,830
Approximate equivalent in short tons	*	—	6,600	—
Rubble, short tons	286,340	470,264	327,180	484,771
Riprap, short tons	1,010,850	925,760	1,536,570	1,451,670
Crushed stone, short tons	32,786,300	33,224,879	41,386,550	42,540,754
Fluxing stone, long tons	16,687,740	14,208,457	22,823,340	20,333,939
Equivalent in short tons	18,690,270	—	25,562,140	—
Sugar factories, short tons	371,430	634,511	474,530	875,774
Glass factories, short tons	166,070	291,854	197,380	301,403
Paper mills, short tons	149,430	264,130	206,740	326,054
Agriculture, short tons	1,195,000	2,150,435	1,278,770	2,160,249
Other Uses	3,317,430	3,808,764	4,625,510	4,877,468
Total (quantities approximate, in short tons)	58,928,660	68,397,927	76,701,360	89,620,007

*Figures for building stone include small amounts for monuments, curbing and flagging in 1922, and for monuments in 1923.

Limestone Sold or Used by the Producers in Alabama, 1922-1923

(Quantities approximate)

	1922		1923	
	Short tons	Value	Short tons	Value
Alabama	830,160	$787,040	1,253,500	$1,362,084

Limestone Sold or Used by the Producers in Alabama in 1923, *by Uses*

	Number of active plants	Building*		Riprap		Crushed stone	
		Rough architectural				Road metal and concrete	
		Cubic feet	Value	Short tons	Value	Short tons	Value
Alabama	20	†	†	30,250	$25,851	129,000	$212,001

	Number of active plants	Fluxing stone		Agriculture		Other uses		Total	
		Short tons	Value	Short tons	Value	Short tons	Value	Short tons (approximate)	Value
Alabama	20	1,084,310	$1,049,022	990	$1,374	4,150	$19,836	1,253,500	$1,362,084

*Figures for building stone include small amounts for monumental work.

†Included under "Undistributed."

Limestone Sold or Used by Producers in the United States for Miscellaneous Uses, 1922 *and* 1923

Use	1922		1923	
	Short tons	Value	Short tons	Value
Alkali works	2,494,260	$1,878,702	3,338,910	$2,348,223
Calcium carbide works	256,190	117,939	276,760	138,854
Refractory stone (dolomite)	146,640	172,251	205,890	249,993
Whiting substitute	66,200	405,783	81,310	514,258
Magnesia works	53,170	79,313	116,410	146,337
Asphalt filler	138,930	549,281	225,400	728,386
Mineral wool	9,170	10,622	6,940	9,333
Carbolic acid works	3,950	3,707	—	—
Carbonic acid works	26,890	53,357	19,830	37,164
Poultry grit	10,792	71,213	13,080	77,004
Lime burners	8,100	4,292	*	*
Stucco	62,870	382,792	66,590	392,591
Roofing gravel	*	*	11,060	27,272
Other uses†	40,268	79,512	263,330	208,053
	3,317,430	3,808,764	4,625,510	4,877,468

*Included under "Other Uses."

†Includes stone sold for manufacture of sulphuric acid, phosphates, terrazzo, artificial stone, ammonia, nitrates, soap, baking powder and other chemicals, the purification of copper, filter stone, road base, live stock mixture, and uses not specified; also roofing gravel in 1922 and for lime burners in 1923.

A considerable quantity of the limestone reported in the tables by uses is burned into lime—particularly the limestone reported by iron and steel producers and by alkali, sugar and paper manufacturers, quarried by them and used in their own plants; also limestone sold to the manufacturers of these and other commodities who may burn it into lime before using it. To avoid duplication this lime is not included in the figures of production in the chapter on lime. Limestone manufactured into lime and into cement and reported in terms of finished product is treated in separate chapters, and the limestone used in their manufacture is estimated in the following table:

Limestone Used for All Purposes in the United States, 1921-1923, *in Short Tons*

Use	1921	1922	1923
Limestone (as given in this report)	45,621,000	58,928,660	76,701,360
Portland cement (including "cement rock")	24,400,000	30,070,000	34,722,000
Natural cement ("cement rock")	90,000	148,000	212,000
Lime	5,060,000	7,280,000	8,140,000
	75,171,000	96,426,660	119,775,360

PRODUCERS

MORGAN COUNTY

W. B. McCullough, C. A. Burleson, Alabama State Highway Dept.

SHELBY COUNTY

Keystone Lime Works, O'Neal's Lime Works.

SANDSTONE

SUMMARY

The output of all sandstone products in 1923 except paving blocks and flagging increased. These products, however, formed only small parts of the total output, which showed an increase of 28 per cent. The report on stone for 1922 contained the names of the principal operators of sandstone quarries and the location of their quarries. The record of sandstone sold or used by the producers in 1922 and 1923 is given in the following tables.

Sandstone Sold or Used by the Producers in the United States, 1922 and 1923, by Uses

Use	1922		1923	
	Quantity	Value	Quantity	Value
Building stone, cubic feet	2,966,400	$1,947,557	3,229,450	$2,130,552
Approximate equivalent in short tons	243,900		245,870	
Paving blocks, number	5,371,260	445,541	4,608,720	416,966
Approximate equivalent in short tons	55,140		44,700	
Curbing, cubic feet	1,811,980	1,237,092	*1,834,686	1,453,271
Approximate equivalent in short tons	148,690		*136,840	
Flagging, cubic feet	650,590	406,731	607,596	422,059
Approximate equivalent in short tons	53,580		43,860	
Crushed stone, short tons	1,947,780	2,342,521	2,260,670	2,628,935
Riprap, short tons	103,040	99,155	341,120	441,634
Rubble, short tons	105,420	128,859	330,090	427,591
Refractory stone (ganister)	724,860	881,314	907,670	1,182,635
Other uses	5,720	32,274	38,450	71,063
Total (quantities approximate, in short tons)	3,388,130	7,521,044	4,349,270	9,174,706

*Apparent discrepancy—decrease in tonnage despite increase in footage as compared with 1922—is due to revision in factor of conversion. The increase as shown by footage is correct.

Sandstone Sold or Used by the Producers in Alabama, 1922-1923

	1922		1923	
	Short tons	Value	Short tons	Value
Alabama	33,750	$41,395	45,660	$39,609

Sandstone Sold or Used by the Producers in Alabama in 1923, by Uses

	Number of active plants	Refractory stone (ganister)		Rubble		Riprap		Total	
		Short tons	Value	Short tons	Value	Short tons	Value	Short tons (approximate)	Value
Alabama	6	29,430	$33,500	*	*	*	*	45,660	$39,609

*Included under "Undistributed."

PRODUCERS

Harbison-Walker Refractories Co., Pittsburg, Pa. Quarry at Rock Run, Cherokee County, Alabama, and also in Calhoun County, Alabama.

U. S. Engineer's Office, Tuscaloosa, Ala. Quarry at Lock 12, Warrior River, Tuscaloosa County, Alabama.

J. Black & Sons, Jefferson County, Alabama.

Tennessee Coal, Iron & R. R. Co., Jefferson County, Alabama.

W. W. Brooks. Quarry in Morgan County, Alabama.

CRUSHED STONE

There was an increase of 25 per cent in both the quantity and value of the output of crushed stone in the United States in 1923 compared with 1922. Stone for road metal and concrete increased 20 per cent, and stone for railroad ballast 54 per cent. There was an increase of 2 cents in the average value of road metal and concrete and a decrease of 4 cents in that of railroad ballast. A special canvass of railroad companies was made in 1923 in order to obtain more complete reports of the non-commercial material quarried and used by them, and the figures thus obtained account to a certain extent for the considerable increase in this product and also for the decrease in average value, as such material almost always shows a lower value than commercial material. A canvass was also made of the highway departments of all the different States to find out if possible the amount of non-commercial material used by them. This canvass, however, was not wholly successful, as only a few of the States could give entirely satisfactory information.

Crushed Stone Sold or Used by the Producers in the United States, 1922 *and* 1923

Kind	Road metal and concrete		Railroad ballast		Total		
						Value	
	Short tons	Value	Short tons	Value	Short tons	Total	Average
1922							
Granite	3,614,250	$4,973,646	482,660	$441,430	4,096,910	$5,415,076	$1.32
Basalt and related rocks (trap rock)	8,313,670	10,284,048	1,290,180	1,370,220	9,603,850	11,654,268	1.21
Limestone	27,906,450	28,966,511	4,879,850	4,258,368	32,786,300	33,224,879	1.01
Sandstone	1,442,280	1,937,472	505,500	405,049	1,947,780	2,342,521	1.20
Miscellaneous	1,149,850	1,421,081	179,050	72,352	1,328,900	1,493,433	1.12
	42,426,500	47,582,758	7,337,240	6,547,419	49,763,740	54,130,177	......
Average value per ton	......	$1.12	......	$0.89	......	$1.09	......
1923							
Granite	4,400,410	5,690,464	608,870	539,645	5,009,280	6,230,109	1.24
Basalt and related rocks (trap rock)	8,550,600	10,793,201	1,697,080	1,680,427	10,247,680	12,473,628	1.22
Limestone	33,382,210	35,925,709	8,004,340	6,615,045	41,386,550	42,540,754	1.03
Sandstone	1,560,300	2,110,230	700,370	518,705	2,260,670	2,628,935	1.16
Miscellaneous	3,154,380	3,836,490	264,150	218,735	3,418,530	4,055,225	1.19
	51,047,900	58,356,094	11,274,810	9,572,557	62,322,710	67,928,651	......
Average value per ton	......	$1.14	......	$0.85	......	$1.09	......
Percentage of increase in 1923	20	23	54	46	25	25	......

Crushed Stone Sold or Used by the Producers in Alabama in 1923

	Concrete and road metal	
	Short tons	Value
Alabama	129,000	$212,001

SUMMARY

BECAUSE of the difference in the units of measurement employed in the various branches of the mineral industry, a summation of the production of the year can include only the values of the products. It is also to be noted that a simple summation of all the values of the minerals or mineral products listed in this pamphlet would give a value much in excess of the true value, since in many cases, as for instance coal and coke, and iron and pig iron and steel, the second product is directly a product of the first, and the value of the first is included in that of the second. To give the values of both as a part of the total would be to repeat, in a measure, at least a partial value of the first or raw product and would give an erroneous result.

As the Survey has not, however, the figures upon which to base an estimate of the percentage of each product which was used in the manufacture of some other product, the summation of the mineral production of the State as here given will be a simple summation of the values reached by the individual branches of the industry.

According to this rather unsatisfactory manner of summation, which does not include the value of steel, bauxite and puzzolan cement, for which figures were not available, the value of raw materials and immediate derived products in 1923 was $167,734,331, an increase of 40.8 per cent over that of 1922.

The production may be classified as follows:

Raw products	$ 70,535,974
Pig iron	64,912,809
Coke (beehive and by-product)	19,817,394
Portland cement	6,257,673
Clay products	4,409,371
Lime	1,627,539
Hydrated lime	173,571
Total	$167,734,331

Below is a tabular presentation of the value of the mineral products of Alabama, as estimated for the years 1912 to 1923, inclusive:

Year	Value
1912	$ 60,141,793
1913	67,530,089
1914	56,769,559
1915	61,791,958
1916	94,987,229
1917	158,008,952
1918	189,426,896
1919	137,187,345
1920	197,699,592
1921	93,353,444
1922	119,080,536
1923	167,734,331

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